# Scientific American.

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES

Vol. XV.—No. 26. [NEW SERIES.]

NEW YORK, DECEMBER 22, 1866.

$3 per Annum [IN ADVANCE.]


## Improved Steam Boiler.

The grand *desideratum* in the construction of steam boilers, apart from their security against accidents, is to utilize the heat and to make steam rapidly with the smallest expenditure of fuel. To accomplish this there should be large heating surface, not too much water, and plenty of steam room. These are the objects sought in the invention herewith illustrated.

Fig. 1 presents a front elevation of the generator, part of which is left, in the engravings, uninclosed by masonry, to show the iron work. Fig. 2 is a perspective view from the side, one wall down for convenience of illustration. The device consists simply in parallel layers of pipes, of any number that may be desired, set on an incline, the rear end being depressed, and the front, over the fire box, elevated. Water is supposed to fill the lower ends of all the tubes and the upper ends of the lower tier.

Fig. 1

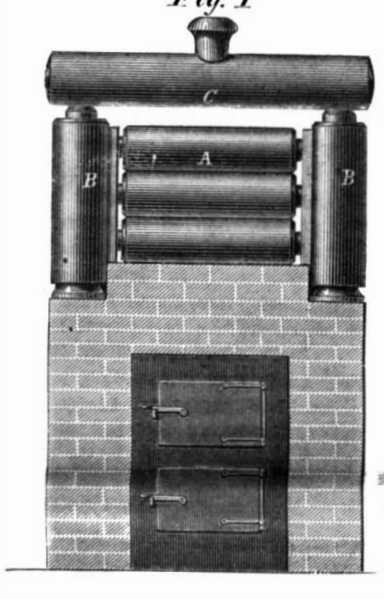
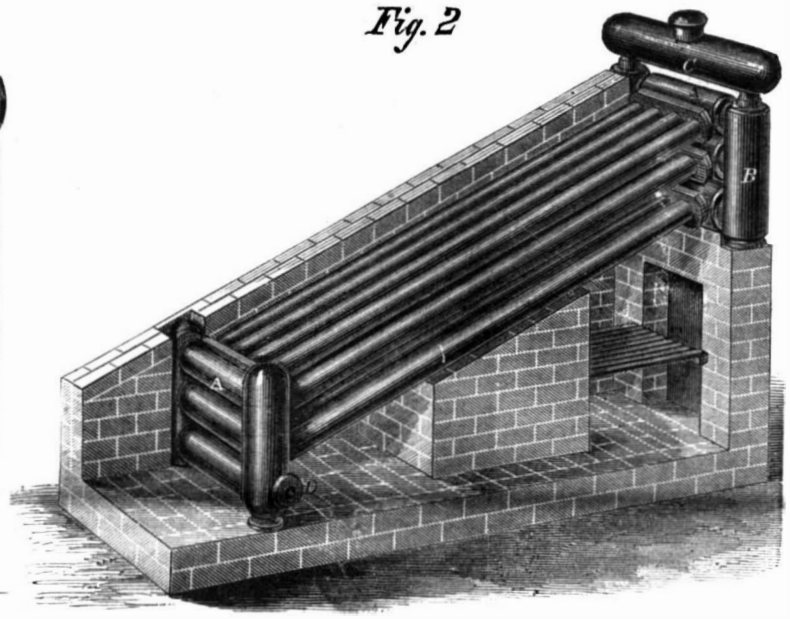



Fig. 2




The tubes, A, are of cast or wrought iron, preferably of the latter material, having right-hand threads cut on one end and left-hand threads on the other, which engage with tapped holes in suitable projections on the horizontal cylinders, A. These are connected with upright cylinders, B, which, at the upper end, sustain the steam dome, C, of any convenient form. The safety valve and steam pipe are attached to this dome. The water inlet is at D, the lowest point.

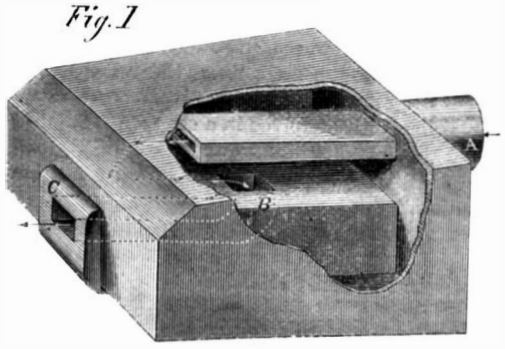
It is claimed that by this form of generator simplicity and cheapness are secured; a large heating surface obtained, and perfect circulation of the water insured. The patent for this improvement was obtained Sept. 11, 1866, for C. S. Bell, of Hillsboro', Ohio, through the Scientific American Patent Agency. All communications relative to the invention should be addressed to Bell & Marlay, Hillsboro', Ohio.

## BELL'S PATENT STEAM GENERATOR.

## BAYLISS'S IMPROVED TWEER IRON.

In scarcely any department of iron working has here been more attempted improvements than in

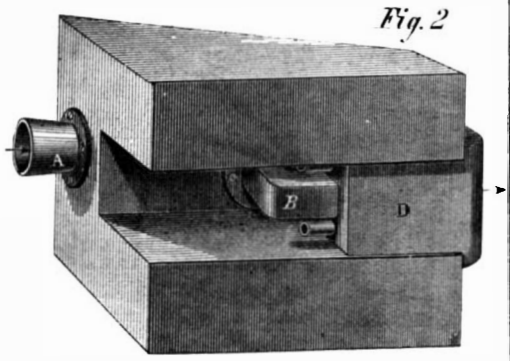
Fig. 1




that relating to the mechanism connected with the air-blast for furnaces and forges. To a superficial observer nothing could appear more simple than the introduction of air, or oxygen, to a fire, by means of an artificial blast; but, in practice few things are attended with more difficulty. A cold blast deadens the fire and hinders free combustion, while a hot blast quickens and forwards the ignition of the fuel. This is the principle of the construction of the tweer herewith represented.

Fig. 1 shows a perspective view of the device, A being the induction pipe for the blast. As seen by the arrows, the air impinges upon the front, which is in contact with the fire, and finds its way, after being heated, through the bent pipe, B, Fig. 2, to the tweer proper, C. Fig. 2 is a view of the under side of the tweer, showing the construction of the

Fig. 2




water box at the back of the air outlet. This box, D, is hollow to the face, C, and has two pipes, seen on either side of B, which are connected, one with the bottom and the other with the top of a reservoir of water, not shown. The water pipe keeps the tweer box filled at all times with cold water, keeping the face of the iron cool, while the other pipe conveys the steam, which may be made by contact of the cold water with the heated surface of the box, back to the reservoir, there to be condensed.

The result is a cool face to the tweer proper, and at the same time a hot blast for the fire, both of them advantages to those who work at blast furnaces or common forges. By this contrivance it is claimed that there can be no making of slag in the mouth of the tweer, and that at all times the blast will be open and clear. Evidently, the idea which lies at the foundation of this contrivance is a correct one.

The improvement was patented through the Scientific American Patent Agency, Aug. 7th, 1866, by John Bayliss, of New York City, corner 54th Street and Lexington Avenue, to whom all applications for rights or information should be made.

## Tea Culture in America.

Liebig, in one of his lectures, observes, 'We shall certainly never be able to discover how men were led to the use of a hot infusion of the leaves of a certain shrub, or a decoction of the roasted coffee seeds.' Fully accepting the assertion of the able chemist as to the hopelessness of the investigation, yet some cause there must be that will explain why the practice has become a seeming necessity to whole nations. The rapidly-increasing demand which followed the introduction of the herb into England, clearly showed the supply of a popular want, and what was at first a hazardous experiment of the East India Company, is now a traffic astounding in its proportions. Competent authorities state that London alone imports 70,000,000 pounds of tea annually; if to this, the receipts of one English port, we add the ceaseless demand of the civilized world, we obtain some idea of the fabulous magnitude of this commerce.

China, from the date of its introduction, and in later years Japan, enjoy the sole monopoly of furnishing the world with tea. Yet this fortune resides in no favorable conditions of climate or soil peculiar to the Celestial Empire. The plant, contrary to general opinion, does not require a tropical temperature; its culture has never been successful in southern China, and it is really a plant indigenous to the warm, temperate regions. The English in India, and the Dutch on the island of Java, have attempted the cultivation of tea on the mountains whose elevation has given the requisite temperature so as to make it a success in this otherwise tropical climate.

We mentioned some weeks since that the tea plant was now being grown in Georgia with highly favorable results. This is not the date of its first introduction into the United States; the attempt was made by Dr. Junius Smith, of South Carolina, twenty years ago. Plants of five or seven years' growth were imported, and a small plantation in the mountainous parts of that State was stocked with them. They were planted in the most favorable situations, the soil and climate being all that could be desired, and the lack of experience appears to have been the only reason for their want of success.

In a communication to the *Southerner*, Wm. Jones, of Liberty county, the experimentist of Georgia above referred to, details his mode of preparing both black and green tea for market.

After several unsuccessful attempts, in March,

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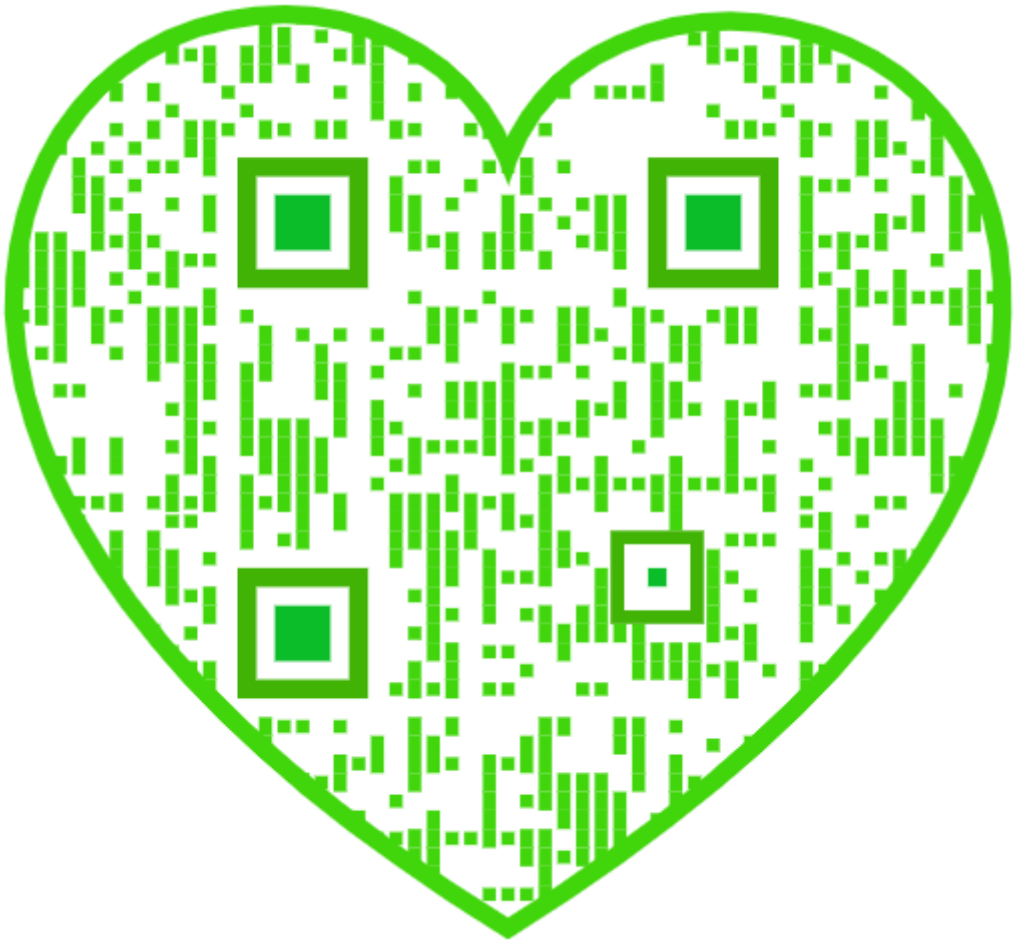

1860, he became the possessor of fifty flourishing young plants. These were set out in a loose, sandy soil, in rows five feet apart; they grew finely for two years, when the first leaves were picked, and from that time to the present the yield has been from five to six pounds yearly. To estimate the quantity which one acre of land planted in tea would make, a medium-sized plant was selected, and yielded one-quarter of a pound. The number of plants to an acre would be 1,764, giving 441 pounds of tea to the acre. An advantage of this crop is that neither cold nor heat, dry or wet, hail, winds, or insects, injure it. The process of drying is as follows:—

The leaves when picked are to be spread out on tables for ten or twelve hours, then they are to be rolled between the hands till the watery juices are expressed, again exposed to the sun for one hour, and rolled till each leaf is curled upon itself. Having undergone this operation, the process is completed by being placed in pans moderately heated and stirred with the finger till perfectly dry.

To make green tea, the leaves are not to be rolled, as in the above preparation of black, but are roasted immediately after the first drying, whereby the original green color is retained. During this process, the Chinese throw into the pan Prussian blue and gypsum, finely powdered, in proportions of a half pound of the mixture to every one hundred pounds of tea. When thoroughly diffused through the mass, this powder causes the leaves to assume a deeper and more brilliant hue.

According to a work published by Mr. Ball, late inspector of teas for the East India Company, in China, both varieties of tea are produced from the same plant, without the admixture of coloring matter, and the striking difference in color and flavor is due to the more violent and rapid action of heat employed in drying the green teas. For black tea, the leaves are slowly dried in the open air, sifted and tossed in large trays, and afterward allowed to lie until they begin to become tinged with red, when they are immediately roasted and rolled. Roasting and rolling are repeated three or four times, until juices are no longer expressed in rolling, when the final desiccation is commenced, in sieves placed over a charcoal fire in a common chafing dish. The fire is moderated by spreading ashes over it, as the evaporation proceeds. It is here the leaves begin to assume their black appearance. On the contrary, for the production of green teas, the leaves are immediately roasted after gathering, in a sort of iron kiln, which is heated red hot, about half a pound of leaves being thrown in at a time, and kept actively in motion. They are rolled and roasted alternately three times, and at the final roasting, begin to take on the tint of bluish green which distinguishes this description of teas.

Mr. Jones seems to have thoroughly mastered the art of preparing his teas in most approved Chinese style, and, according to his statements, his experiments must be a success. Whether the cultivation of the tea plant will attain any considerable importance in this country is still an open question. To prove profitable, we shall have to contend against the experienced labor of the Chinese, and if even the crop becomes one of our staples, it will be when the ingenuity of inventors has devised some more expeditious way to supersede the present tedious and primitive mode of curing the leaves; we may then hope to contend successfully against the exceedingly low price at which labor is rated in China.

## FOGS, CLOUDS, AND RAIN, IN THE MOUNTAINS.

For the Scientific American.

A sojourn of a few summers in the southwest Alleghanies afforded me an opportunity of witnessing some of the interesting scenes, frequently occurring, in which fog and rain play their part. One morning, about 7 o'clock, while awaiting breakfast, I seated myself in front of the log cabin of Edward Delozier, with whom I had tarried over night. The house is located in Tuskegee cove, Cherokee county, North Carolina, and is surrounded on three sides, north, south, and west, by mountains, one of which ascends in a peak, fourteen hundred and fifty feet, and another eighteen hundred and fifty feet, above the Tuskegee Creek—the highest one having an altitude of about four thousand feet above the sea level. To the eastward there is a wide opening, in which hills of a moderate elevation only are interposed. On the south, a gap in the mountain affords an outlet to the horseman, and on the west a deep notch serves a like purpose.

Suddenly, a few misty flakes of fog came moving slowly through the notch, from the Chevah valley, on the west. Presently, larger masses followed, and these, again, were succeeded by still more extensive volumes. Breakfast over, we resumed our seats, Mr. Delozier warning me not to set out upon my journey. The fog was now rolling through the notch tumultuously, and filing off gracefully to the right and left, like soldiers passing a defile and preparing to attack an enemy, by extending the wings of their battalions.

From our position, the fog wore the appearance of gigantic fleeces of the whitest wool. Onward, and still onward, its masses rolled along, the foremost seeming to be impelled forward, not by the winds, for it was calm, but by the fog in the rear; or rather, perhaps, by the force of an upper current in the atmosphere, or the changing condition of the air from the warming influence of the sun's rays, now shining fully into Tuskegee cove, over the eastern hill-tops. But the darkening clouds accumulating faster and faster, soon covered not only the mountain sides, but overspread the whole area of the cove; and, advancing eastward, obscured the face of the sun as with a curtain, shutting out his beams from the landscape around. We were now startled by a sudden flash of lightning, succeeded instantly by the roll of the thunder, which, reverberating among the mountains, prolonged its tones to a duration unknown to the dwellers in the lowlands. The rain, which for a few minutes had fallen in a feeble drizzle, now descended at once in a copious shower, as though it had been awaiting the signal of the electrical flash, to do its errand of mercy.

Like all mountains composed of stratified rocks, those of North Carolina run in lengthened ranges, mainly, from north-east to south-west. In countries where the unstratified rocks prevail, the mountains are often thrown up into dome-shaped forms. Here and there, however, in this part of North Carolina, there are points which rise dome-like, a thousand feet above the ordinary elevation of the mountains. Some of them reach an elevation of two hundred or three hundred feet above the line at which the ordinary forest trees can grow, and are destitute of timber, though covered with grasses and flowers.

These elevated domes have much to do with the formation of clouds and the production of rain. The philosophical explanation of this fact is presented in the previous article on water spouts. These domes are locally called *balls*, from their rounded appearance and naked surface. In the clearest days, often, the clouds can be seen forming around them at a greater or less distance above or below their summits. At times the rain fall is limited to the area around the ball, where the cloud spends itself, so that its remaining vapor is drifted off or dissolved again in the atmosphere. At other times, the clouds accumulate largely, and either from the influence of currents of wind, or from electrical action, they move off so as to water the surrounding mountains and intervening valleys It is not unusual for two balls, or for the summits of the lower mountains, to be forming wreaths of clouds around their brows at the same moment. These clouds, not unfrequently, are attracted toward each other, and thus the vegetation of the intervening districts has an additional chance of receiving new life and vigor from the rains yielded by this means.

In 1857, in the month of July, I set out on foot from the head of Valley River, a branch of Hiwassee River, to measure, with Lock's level, the hight of the Valley River Ball. The distance was five miles, and the proximate hight above the Hiwassee proved to be within a fraction of three thousand feet. Before reaching the top of the main ball, a cloud came sweeping along from the direction of the Tusquitta Mountain, to the south-west, pouring down its rain as it progressed. This we could see very distinctly. It reached us in our elevated position in the form of a dense fog, as all clouds appear when one is in their midst. It first struck our mountain at a point about five hundred feet below its summit, and rolled along, greatly agitated, amid the trees to the top of the ball. While hovering there, as a hen over her brood, it sent an arm down the eastern side of the mountain, above the tree tops, to a distance of several hundred feet; and then, as if reluctant to lose any part of its mass, this arm was drawn up again into the bosom of the cloud. Rendered light and airy, from the loss of its rain, the cloud soon swept off to the eastward, so that our measurements could be completed.

Nearly all the balls in sight, more than a half-dozen in number, and many of the higher portions of the lower ranges of these mountains, were repeatedly covered by rain clouds during the day, which were either formed upon them, or floated to them from one or another of the surrounding elevated points. Four or five of these clouds passed up Valley River toward us, but were generally exhausted of their rain before reaching our positions. These showers presented varied appearances, as they succeeded each other. The first was from a cloud, the margins of which were equal in depth and density to the main part of its body. Its breadth was nearly equal to the width of the valley. There being little wind, the rain fell vertically, and presented the appearance of a large curtain, of semi-transparent gauze, suspended from the cloud to the earth, having a length of two thousand feet. A second shower fell, an hour afterward, from a cloud with attenuated margins but dense center. The sheet of water falling from it presented the appearance of a semi-transparent fog in its center; but it gradually shaded off, toward the margins, into a misty haze, scarcely obscuring the objects in the background. A third, which occurred during our descent, was from a dense black cloud that overshadowed the valley and half the adjacent mountains. It had also great length to the westward. The body of water which it afforded was so dense, and the distance through which the eye had to penetrate so great, that every object in the background was as completely obscured as though the pall of midnight had been drawn across the valley.

A phenomenon of a very strange nature occurs at Clayton, Ga. This town is located a little to the south of Rabun Gap—a low depression in the Blue Ridge. The mountains on each side of this gap rise to the hight of fifteen hundred feet. The sun was just rising on the morning after my arrival at this town. Looking toward the north, I beheld a vast volume of fog, filling Rabun Gap from base to summit, and occasionally extending even above the highest parts of the mountains on either side. It was as white as snow, and resembled a vast deluge of cotton as it falls loosely from the gin. In front of the main gap, and between it and the town, there stands a small mountain, detached from the principal range, with a gap upon each side. The fog, as it rolled through the main gap, was deflected into the smaller gap, to the east of the little mountain.

On viewing it for a few minutes, I was soon startled by noticing that, though the whole immense volume of the fog was rolling forward at quite an observable rate of speed, yet it never passed much beyond the southern side of the little mountain. Onward it came, with a sufficient force and bulk to overwhelm, in its shadow, the whole southern side of the Blue Ridge; but beyond the line named it could never pass. A barrier existed there, in the different conditions of the atmosphere, which at once dissolved the fog, and left the air beyond as transparent as ever. Once in a while a small portion of the fog would whirl forward, a few hundred feet beyond the main mass, like a bold leader in front of an army, but in vain; leader and follower being instantly involved in a common fate. The law which controlled the movement of the fog, said to it emphatically: "Hitherto shalt thou come, but no further."

Turning to my friend, who had patiently watched me while I was absorbed in contemplating this wonderful scene, I inquired if it had ever occurred before. "Yes, sir," he answered," it occurs every clear morning, preceded by a calm night, from spring to fall. Beginning to roll through the gap a little before sunrise, it continues till eight o'clock sometimes, and as late as ten at others; and this it re-

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peats every clear morning, as I said, and has repeated, doubtless, ever since the dry land appeared, and the mountains and the rivers were formed."

A word or two, only, of explanation: Saussure and Kratzenstein have investigated the nature of fogs and mists. The vapor in this condition, is found to consist of minute globules, upon which rings of prismatic colors were discovered like those seen upon soap bubbles, but which are never observed upon drops of water. From this discovery it was concluded that the globules are hollow, and filled with air or gas. The size of these globules is greatest when the atmosphere is very humid, and least when it is dry. With this explanation, the phenomena of the fog at Clayton can be readily understood.

The Little Tennessee River takes its rise in Rabun Gap, and run north-west. It is walled in on each side by mountains of fifteen hundred to twenty-five hundre feet in hight. The sun during the hottest hours of the day, teems down its rays into the valley, and imparts a great amount of heat to the waters of the river, as well as to the rocks among which it runs. The temperature of the water is thus kept up during the night, while, at the same time, the surrounding mountains cool the overhanging air. The vapor which rises rapidly from the heated water, coming into contact with the cold atmosphere above, is converted into fog. As the sun rises in the morning, his rays at once act upon the air south of the gap, where no obstruction exists; but his heat cannot affect that of the narrow valley of the Tennessee, till the sun attains a sufficient elevation to overcome the altitude of the mountain upon its eastern side. The rarefaction of the atmosphere on the south side of the Blue Ridge, while that of the Tennessee valley remains at a lower temperature, produces a current of air from north to south that bears the fog along with it through Rabun Gap. But here the increased heat, expanding the air or gas in the globules of vapor composing the fog, bursts the bubbles as fast as they advance, and the fog is dissolved by absorption into the warmer atmosphere, as transparent vapor. D. C.

## THE CULTIVATION AND USES OF FOREST TREES.

Something must soon be done in the oldest settled portions of this country to encourage the growth of our forests and to prevent the indiscriminate and wholesale destruction to which they appear to be exposed. The annihilation of forests has within a few generations greatly injured the productiveness of some soils, dried up the springs, and cut off the sources of streams. The same causes which have in the old world turned fruitful plains into sterile deserts, will work in time a similiar result here. For this reason we welcome such sound advice as the following from the "Forest Tree Culturist," lately published by Geo. E. and F. W. Woodward, 37 Park Row, New York.

"I know many large land-owners who have been toiling for the past thirty years to lay up something to keep them in their old age and leave a balance to their children. They have worn themselves out as well as their land, and that something for which, they have so arduously labored has not been obtained and their children are likely to inherit a poor, worn-out farm instead of that competency which their father expected to have left them. Suppose These men had left one half their farms covered with the original forest, or if it was already cleared when they came into possession, they had planted one half with forest trees, and then expended all their labor upon the other half, they would have produced better crops and with more profit; one half of their farms would have been rich, and the other half covered with a forest that would be a fortune worth inheriting.

"Thousands of men are toiling this day to lay up wealth for their children, when if they would invest a small amount in land, and then plant a few acres of our best forest trees, their money would grow into a fortune by the time their children had grown into manhood. To some this may appear visionary; but the writer has lived long enough to see trees grow from saplings that would hardly bear his weight at ten years old, up to great trees two feet in diameter, and he has scarcely passed the half-way house of three-score and ten.

"In many portions of our country we need forests, not only for supplying us with timber, but for protection against winds and hurricanes. The farmer's grain is often prostrated by winds that never reached his fields until these protecting forests were destroyed. Fruit-growers are seeking the best means of shelter for their orchards, and a remedy for that dry atmosphere which sweeps through their gardens, shriveling up their finest specimens, checking, if not entirely annihilating, their ardor for fruit-growing.

"The little stream that formerly came singing and dancing down from the great wood on the hill is now seen only for a few weeks in the early spring and fall, and then there is nothing left but its dry, pebbly track. Is it not time we beagn to retrace our steps and again cover our now barren hill-sides and many of our valleys with those trees which were not only an ornament and blessing to our land, but would now be a source of incalculable wealth?

"The great West, with its wide-reaching, treeless prairies, feels the need of forests even more than we do in the Atlantic States. The farmer on the prairies needs a shelter from the winds, the value of which no one but those who have experienced the want can appreciate. In no way can such a protection be provided better or cheaper than by a belt of trees. Then the convenience of having timber near at hand for building fences, stakes for vines, trees, and a thousand little necessities for which wood is indispensable.

"A farmer who has provided a belt of trees around his farm, has protected his fields from winds, and his grain will remain standing until ready to harvest. His fruit remains on the trees until ripe; and in a great measure his buildings are safe against those fearful hurricanes which frequently rush with such destructive force across those level plains. If people will persist in residing on those prairies, they certainly ought to be protected, but they should learn how to do it themselves, and not expect that Nature will rear it merely for the asking, without putting forth an effort on their part.

"I those piece which leads me to think that years near those grand old prairies where the wind went and came without hindrance. One afternoon, on coming home, I found my house unroofed, and the place where a greenhouse stood in the morning swept clean, not a flower-pot, brick, or piece of glass left to show that I ever possessed a conservatory of fine plants. I can call to mind several instances of like character, each of which leads me to think that a strong protection is often required to enable the settler in the West to keep his foothold after he has obtained one.

"The question is, How shall protection be the most readily provided?—how shall we get the trees we need? My only answer is, *Grow them!* This will require time and expense, most certainly—and what blessing does not? It takes time to get wealth unless you are so fortunate, or unfortunate, as the case may be, as to have it given you; if so, it probably required time for the giver to obtain it. The great and important truth which I wish could be impressed upon the mind of every land-owner in America is, if you want improvements, *begin*, yes, begin them now! Do not put it off because you have no time to attend to it at present, nor because it will take so many years, and a little outlay at the start. You may say, I cannot wait so long.' Who asks you to wait? Time moves in spite of you. Plant the seeds to-day, and while you are making up your mind whether you will wait a few years for them or not, the trees will be growing."

## THE McCALL AND SLOPER PROCESS FOR PRESERVING FRESH MEATS.

We have several times called attention to the results of the above process as shown in experiments on a large scale, the products of which were discussed, a few weeks ago, at a banquet given by the managers of the enterprise, in London. Knowing that our readers would be interested ir ascertaining the *modus operandi*, we have procured from the English Patent Office a copy of the specification. It will be recollected that at the banquet referred to, beef, from the South American pampas, was served up in steaks. roasts, joints, boiled, in soups, and in every style of cooking, and was pronounced good by all who partook. It was claimed on that occasion that good fresh beef could be brought to London and sold at retail for four pence per pound. The following are the specifications and claims in the patent of John McCall and Bevan George Sloper:

"Our improvements relate to preserving fresh meat, poultry, game, and fish. We treat such food in one or other of the following methods:—We immerse in or surround the meat for a short time, say from ten to fifteen minutes, more or less, with a solution of bisulphite of soda or potash, in the case or vessel in which it is to be preserved, and which must be capable of being made air-tight. By this immersion we remove the air which filled the vacant spaces in the case; we then withdraw the solution and replace it by carbonic acid gas; we repeat these immersions and supplies of gas occasionally as required. We introduce into the case containing the food a regulated quantity of dilute sulphurous acid, and an equivalent quantity of carbonate or bicarbonate of soda or potash separately. The acid and alkaline salt do not come into contact until the case is hermetically closed, when they are brought into contact by agitation, and the liquid resulting charged with carbonic acid bathes the surface of and impregnates the meat; or the acid and salt may be brought into contact before the case is closed; or we place the meat in a case provided with two stop-cocks, one in or near the bottom, the other in the lid. By the lower stop-cock we introduce a solution of bisulphite of soda or potash, filling the vacant spaces in the case; we then close the stop-cock in the lid and exhaust the case of its liquid contents by powerful hydraulic suction, or by the action of an air-pump. We leave the meat under this exhausting suction and thus draw out from the meat as much air as it will yield up, which we then expel from the case by the introduction of a solution of bisulphite of soda or potash, which we afterward withdraw and replace by carbonic acid gas. We repeat at intervals these alternate introductions of the alkaline solution and carbonic acid gas.

"When metallic cases are used either for preserving or packing the food we use a lining both for the top, bottom, and sides of a non-metallic nature, such as thin matting, wickerwork, veneers of wood, cloth, or other suitable materials.

"We preserve poultry, game, and fish in the same manner as that described for meat.

"And having now described the nature of our said invention, and in what manner the same is to be performed, we declare that we claim as our improvements in preserving fresh meat, poultry, game, and fish—

"First, the employment of bisulphites of soda and potash, substantially in manner hereinbefore described.

"Second, the process hereinbefore described whatever the antiseptic salt employed.

"Third, the employment of an alkaline salt together with carbonic acid, or the substances producing the same, sulphurous acid and carbonate or bicarbonate of soda or potash, acting in manner hereinbefore described.

"And we claim as our improvement in the vessels employed in preserving fresh meat, poultry, game, and fish, by any of the methods hereinbefore described, the lining of the same with matting, wickerwork, or other like suitable material to protect the substance being preserved from contact with the vessels."

In a note on the employment of a double wire rheometer in experiments on radiant heat, sent to the Academy of Sciences by M. P. Desains, the author states that he employs a kind of differential apparatus essentially composed of a single source of heat, of two piles, of a double wire rheometer, and finally of a rheostat. The apparatus is so arranged that the equilibrium, once obtained, remains uniform however the heat from the source varies; but if the smallest variation takes place in one of the radiations the needle quits the zero point. M. Desains has applied this apparatus to the examination of the absorption of heat by transparent gases, and finds that it gives very delicate and certain indications.

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## AMERICAN INSTITUTE---POLYTECHNIC BRANCH.

The usual weekly meeting of this association was held on Thursday evening, Dec. 6th, Prof. Tillman presiding.

After the reading by the Chairman of the usual summary of scientific news, Prof. Fleury presented a new application of the old reacting steam engine, described by Hiero of Alexandria, 130 years B. C.

### IMPROVED EOLIPILE.

The object to be attained by the use of this apparatus is purifying the vitiated air of churches, theaters, and crowded lecture rooms. The engine consists of a metallic disk-shaped vessel provided with four horizontal jet pipes, the open ends bent at right angles, the whole revolving on a vertical axis. On the application of heat, perfumed water within the vessel is given off as steam, which, disseminated by the rotation throughout the apartment, absorbs and precipitates the poisonous matters present. The apparatus may be made serviceable in other ways, such as destroying flies, mosquitoes, and moths, by projecting into the air steam from liquid preparations poisonous to these insects, but harmless when inhaled by man.

Mr. F. W. Bacon, of 84 John street, New York, described the construction and operation of the

### STEAM ENGINE INDICATOR.

As the stethoscope shows to the skillful physician the secret workings of the inner system, and detects any minute derangement, so this instrument is valued by the engineer as furnishing similar information for the steam engine. Its employment determines whether his valves are set so as to take and relieve the steam at the proper moment; it notes the pressure in the cylinder at each point of the piston's stroke, at what part the cut-off begins, and demonstrates the advantages of using steam expansively. Coeval with Watt, the infrequency of its employment at present has been owing to inaccuracy in results at high pressures, but within the past five years the instrument has been brought to a high degree of perfection, and its use is now as satisfactory, with a rapid velocity of piston and high pressure of steam, as was the old McNaughton indicator applied to slow-working engines. The leading points in construction are, first, a piston having an area of exactly one-half square inch, moving without friction in a cylinder, the motion being restricted by a spring of known rigidity. The varying pressure of steam is recorded by a pencil as a continuous line drawn on paper placed on a drum, which latter revolves by a connection with the cross-head or point coincident in motion with the piston. The invention was ascribed to Watt, by the speaker; the chairman dissenting, a debate arose as to how much credit Watt was deserving of as an original inventor. As the subject required more time for discussion, it was appointed as a special topic to be taken up at some future meeting.

### OCEAN CURRENTS.

Dr. Stevens re-opened this subject. In the investigation of the unknown, fragmentary truths are gathered and serve as a skeleton from which speculative minds form theories or hypotheses.

The origin of this earth has been a fruitful theme of investigation for philosophers. A brief reference was made by the speaker to the views advanced and defended at different times by able theorists, one school believing the planet to have assumed the spheroidal state while in a molten mass; that, losing heat by radiation, a crust was formed on the outside; that this crust fell in on the formation of a vacuum beneath, the surface then appearing as ridges, or mountain chains. Herschel, Laplace, and, later, Herbert Spencer, accepted the nebular theory or the condensation of nebulous matter into definite forms. The Plutonic theory of Hutton ascribes the origin of mountains to the action of internal fire.

The ocean, in either case, held no creative power, but its action was, change and reform. "Anthony's Nose" on the Hudson, the Iron Mountain of Missouri, and an important peak among the Rocky Mountains, were the leading features of our continent in the earliest times. The tidal wave was the agent by which the intervening areas were filled, carrying and depositing the debris from the dissolution of a previously existing continent.

Further elaboration of the speaker's view was not permitted owing to a misunderstanding on the part of Prof. Grimes, who, believing that the remarks were intended in some way as objections to his views, occupied the remainder of the evening until a late hour with a re-statement of his theory of ocean currents, presented at the last meeting, and fully laid before our readers in a previous report.

## THE LAW OF MARIOTTE---ITS RELATIONS TO THE LIQUEFACTION OF GASES.

We receive sometimes inquiries about the pressure of air under certain circumstances, which indicate that the above mentioned law is not as universally understood as it deserves to be.

The law of Mariotte is this: *The volume of a given weight of gas is inversely as the pressure to which it is exposed;* that is, the greater the pressure the smaller the volume, and *vice versa*; so if the volume is reduced to one-half, the pressure will be double, if the volume is reduced to one-tenth of the original bulk, the pressure will be ten times greater, etc.

Applying this to air and gases of which the mean pressure is 15 lbs. to the square inch, we find that by reducing the volume to one-half we have 30 lbs., to one quarter 60 lbs., to one-tenth 150 lbs., and to one-fortieth we have 600 lbs. pressure to the square inch, and this rule is correct for common use; but when great accuracy is required, deviations have been found, differing among themselves for different kinds of gases.

In the first place, in those gases which will liquefy by increased pressure, the law is only tolerably correct as as long the pressure keeps the gas far enough from its point of liquefaction; but the compressibility will strongly increase when the gases reach the point; that means, the volume will be less than the law would deduce from the pressure, as soon as the gas is about to be liquefied.

We may arrange the gases which have been liquefied by pressure into a table, adding this pressure in atmospheres and in pounds to the square inch, at the temperature of 32° Fah.:

| Name of gas | Pressure in atmospheres. | Pressure in lb to square in. |
|---|---|---|
| Sulphurous acid | 1·5 | 23 |
| Cyanogen | 2·4 | 36 |
| Hydriodic acid | 4 | 60 |
| Ammonia | 4·4 | 66 |
| Chlorine | 9 | 135 |
| Sulphureted hyd'n | 26 | 330 |
| Nitrous oxide | 30 | 450 |
| Carbonic acid | 40 | 600 |

If the temperature be higher than 32° Fah. the pressure will be greater (at 90° it will be about double); if the temperature be lower the pressure will be less, therefore during the liquefaction process cold is always employed in addition to the pressure.

Not only have these gases and several others been liquefied, but these liquids have been frozen; we give here the temperatures at which liquefied gases freeze below zero:

| | Deg. Fah. |
|---|---|
| Cyanogen | 31 |
| Hydriodic acid | 58 |
| Carbonic acid | 76 |
| Ammonia | 103 |
| Sulphurous acid | 105 |
| Sulphureted hydrogen | 125 |
| Nitrous oxide | 150 |

Quite recently experiments have been made by Natterer with powerful condensing apparatus, by which he exerted a pressure of 3,000 atmospheres, or 45,000 pounds to the square inch; it was found that only 7 gases are left which withstood the pressure without being liquefied, out of some 40 which were liquefied. These uncondensable gases are:—air, oxygen, nitrogen, hydrogen, carbonic oxide, marsh gas, and nitric oxide.

It was also proved that these gases, at moderate pressures, followed the law tolerably correct, but at very strong pressures, say of 100 or more atmospheres, their volume was much larger than after Mariotte's law the pressure would require, so that at 1,000 atmospheres' pressure, it is only one five-hundredth part, and at 3,000 atmospheres only one seven-hundredth to one-thousandth part of the original volume.

In our next article we shall treat the relations of Mariotte's law to steam pressure.

## AREA OF STEAM PORTS.

The proper area of a steam port, or any passage between a boiler and its engine, depends mainly on the following facts:—

First—That the boiler makes the steam at a uniform rate, say as many cylinder fulls as the engine makes strokes in a minute, if we take the cylinder as the unit of measure.

Second—That the rate at which the engine uses this steam at any point of the stroke depends upon the corresponding position of the crank and connecting rod with each other; for example, when the crank and connecting rod are in the same straight line the engine is using no steam, and when the rank and connecting rod are square with each other the engine is using steam fastest.

Third—That the pressure of steam must be the same in the cylinder and boiler during the admission, or until it is cut off, in order to have the engine work economically.

Fourth—If the port is so small as to cause the steam to move through it faster than at the rate of one hundred feet in a second (about one-twentieth of the velocity with which steam would rush into a vacuum) the steam will be "wire drawn," that is, the pressure of steam in the cylinder will be less than that in the boiler.

From the above it is plain that the port should be large enough to allow the steam to pass through it at a rate not exceeding one hundred feet in a second when the piston is at about the middle of its stroke, or at the moment when the speed of piston is the same as that of the crank pin. It is also plain that the proper area of the port is directly proportional to the area of the cylinder and speed of the crank pin, and inversely proportional to the *proper* speed of the steam when passing through the port *fastest*.

Therefore we can get the proper area of a port by multiplying the area of the cylinder by the number of feet that the crank pin passes through in one second, and dividing by one hundred (or simply cutting the two right hand figures from the product).

Example—What size should the port of a steam cylinder be, which is twelve feet stroke and seventy inches in diameter, in order that the engine may make seventeen revolutions in a minute? Area cylinder=70×70×7,854=3,848 square inches. Speed of crank pin=12×3½×17÷60=10½ feet per second. Area steam port=3,848×10½÷100=404, square inches.

## The Canada Gold.

The recent gold discovery at Madoc, C. W., is the subject of increasing excitement. Miners, speculators, and prospectors throng into the little village at the rate of a hundred in a day, filling up the inns and farm houses for miles around; and one Yankee is preparing to put up a large hotel. Several thousand acres of land have been taken up by speculators, in Madoc, Hungerford, Huntington, Tudor, Marmora, and other neighboring townships. The noteworthy peculiarity of this region is that the discoveries of gold have all been made in the surface quartz on the hill tops; an extraordinary circumstance, from which is inferred the existence of very rich deposits at a proper depth, as well as of rich placers in the valleys. The latter are too much obstructed by water at present to allow of prospecting. It is remarked that in this instance, not for the first time, the prognostics of geologists in respect to gold were at fault, a professional survey having not long since resulted in a decision that gold did not exist in this region. It lies in Hastings county, about fifty miles north of Lake Ontario, and twenty-eight miles north of Belleville on the Grand Trunk Railway. It constitutes but a small portion of a country of similar general character, covering the shore of Lake Ontario for a hundred and fifty miles, and extending as far to the interior; broken, rugged, and filled with innumerable little lakes and streams. Probably the whole of this region will be alive with exploration and excitement, next season, if the rich reports of the two or three openings made at Madoc should be fully confirmed.

A bridge on the Mississippi is to be commenced at Quincy, Ills., in January.

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## Correspondence

### To Measure Belting.

MESSRS. EDITORS:—The subjoined is a very convenient rule for checking invoices of machinery belting, and far more expeditious than the ordinary method of measurement. It is derived directly from the equation of the spiral.

*Rule.*—Length of belt (in feet) equals the sum of the diameters of the roll and eye (in inches) multiplied by the number of turns in the roll; and this product multiplied by the decimal ·1309.

*Example.*—Roll of 3 feet belting, the mean diameters of roll and eye are 36 and 4 inches. Number of turns equal 73.

| | |
|---|---|
| | 36 |
| | 4 |
| | — |
| | 40 |
| | 73 |
| | —— |
| | 2,920 |
| | ·1309 |
| | —— |
| Total length | 382·23 feet. |

To insure a perfectly correct result the diameters must be measured with great accuracy.

W. S. A.

### It Inspires the Habit of Thinking.

MESSRS EDITORS:—I was a subscriber to your paper for several years, until my eyesight and health failed, and I am in honor bound to say that it would "pay" for every family to take, read, and study it. Reading your paper inspires the habit of thinking how to do anything to save time and labor.

In 1848 I moved on a farm and hired a man to build me a barn. I assisted him to haul the sills by "doubling teams," that is, hitching my horses in front of his. We swung one end of the sill under the hind wheels of a wagon and "snaked" it to the barn, but broke one axle and wheel. I have since built another barn, and when doing so, used to send my two boys, then aged 11 and 14 years, with two horses only, who brought the sills with case, in half the time required on the first barn. This was the result of mixing a little of the SCIENTIFIC AMERICAN with brains.

J. L. H.

[For the Scientific American.]

### Position of the Piston when the Crank is Vertical.

An advice I always used to give to young persons studying the mathematical sciences was, not to commence geometry before being perfectly familiar with arithmetic, and not to commence trigonometry before knowing well geometry and elementary algebra. All my colleagues in the department of mathematical instruction agree that the great drawback in this profession is the unsatisfactory preparation of the young men under their charge in the elementary branches, impeding powerfully, and sometimes checking entirely, their progress. Mr. H. W. S., from Cincinnati (who imprudently asserts, page 351, current volume, SCIENTIFIC AMERICAN, that the rule given by me, page 268, is incorrect), is a case illustrating this point. He appears to understand trigonometry without understanding plain geometry, otherwise he would have found the demonstration of my rule in place of doubting its correctness, which doubt was originated by his deficiency in arithmetic and elementary algebra, as is proved by the errors he committed in applying my formula; when he corrects his errors, he will find that the results perfectly agree with the trigonometrical calculations.

This problem is, in fact, one of my old examination questions, and some of my former students may give the demonstration which I omitted, not wishing to burden your paper with an unnecessary woodcut, supposing it simple enough to be found by any one acquainted with elementary geometry, not expecting that some one would think that I could possibly publish a rule at random, found by guessing at it.

It appears he found my rule correct in one particular case, because he accidentally committed no mistake this time; but his statement that for all lengths of connecting rod my rule gives exactly the same result, is as absurd as his assertion that no formula can be given.

DEMONSTRATION OF THE RULE GIVEN PAGE 268.—In this figure the piston rod is omitted for simplicity's sake, *eo*, *co*, and *do* is the crank, and *cd* or *ab* the length of the stroke, *ge* the connecting rod which, for the sake of argument, I take quite long. Let the end of the connecting rod be in *a* and in *b*, when it is on the center, and in *g* when the crank *eo* is vertical, we will have

$$ae=bd=ge$$

in the rectangular triangle *goe* we have

$$ge^2=go^2+oe^2 \text{ or } go^2=ge^2-oe^2$$

and consequently

$$go=\sqrt{(ge^2-oe^2)} \quad (1)$$

but $$go=ac+oc-ag$$

or $$go=ge+oe-ag \quad (2)$$

making an equation of these two values of *go* obtained at (1) and (2) we have

$$ge+oe-ag=\sqrt{(ge^2-oe^2)}$$

from which $$ag=ge+oe-\sqrt{(ge^2-oe^2)}$$

Call now, for simplicity's sake, *ge* the connecting rod *m*, and *oe* the crank *n*, we have for *ag* or the distance of the piston from the further end of cylinder

$$m+n-\sqrt{(m^2-n^2)}$$

which is the rule given page 268, and "a perfect formula for all cases."

Let us now apply this rule in the cases Mr. H. W. S. mentions. Stroke, 4, connecting rod, 8, crank, 2, or $m=8$, $n=2$, we have

$$8+2-\sqrt{(64-4)} \text{ or } 10-\sqrt{60}=2·254033$$

the same as by trigonometry, and not 2.54 nor 2,265

For connecting rod, $m=4$, and crank, $n=2$ we have

$$4+2-\sqrt{(16-4)} \text{ or } 6-\sqrt{12}=2·535898.$$

For connecting rod, $m=3$, and crank, $n=2$, we have

$$3+2-\sqrt{(9-4)}, \text{ or } 5-\sqrt{5}=2·763932.$$

For connecting rod, $m=2$, and crank, $n=2$, we have

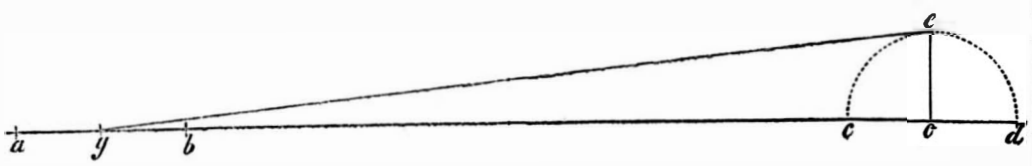
$$2+2-\sqrt{(4-4)}=4$$

showing that the piston is at the end of the stroke when the crank is vertical.

For connecting rod, $m=2$, and crank, $n=3$, we have

$$2+3-\sqrt{(4-9)}, \text{ or } 5-\sqrt{-5}$$

As the square root of a negative number is impossible, this result of the application of our formula agrees with the fact that the machine becomes impossible when the crank is longer than the connecting rod.




It is seen that for the solution of the problem in question, the resort to trigonometrical calculation is unnecessary, and a round-about way, but we may go a step further, and propose a new problem, namely:

TO FIND THE ANGLE OF INCLINATION OF THE CRANK FOR EVERY GIVEN PORTION OF THE STROKE.—Mr. H. W. S. has given us, page 353, the figure for this problem, without any demonstration, only communicating a few results of the trigonometrical calculation, stating that "no formula can be given for all cases." I will give the formula deduced from that figure but as this article is long enough, I postpone it to a later number.

P. H. VANDER WEYDE, M. D.
Formerly Professor of Higher Mathematics and Mechanics at the Cooper Institute, New York City.
Philadelphia, Nov. 25, 1866.

### Goulding's Patent.

MESSRS. EDITORS:—Your issue of Nov. 10th, contained a notice of the late decree of the U. S. Circuit Court in the case of Jordan *vs.* Agawam Woolen Company, involving the validity of the "Goulding Patent."

This case has already been appealed to the Supreme Court; therefore your statement that the decision of the Circuit Judge was a final one, was erroneous, and as this is, undoubtedly, as you characterize it, "in its effect one of the most important cases ever argued in this circuit," you will doubtless be gratified to give correct information on this point to the many soo deeply interested who look to your columns almost as authority on such subjects.

T. QUINCY BROWNE, Chairman of Committee.
Boston, Dec. 1, 1866.

### The Cotton Manufacture.

MESSRS. MUNN & Co., GENTLEMEN:—I am in receipt of your circular, and will make an effort. I have been a reader of your paper ever since 1849, with an intermission of four bloody years. I am superintendent of a large cotton mill—the only one out of eight left standing by Sherman. I took charge of this mill nine years ago, at a salary sufficient to support myself and family of eight persons, and am now paid by the company five hundred per cent more wages than at that time. I attribute this result to the fact of my being a constant reader of your paper, as no mechanic can read a single number without learning much.

I am glad to see you contemplate enlarging it. Without the advertisements it would not be complete. I will give you an illustration: A few months back we wanted a water wheel and advertised for one in the SCIENTIFIC AMERICAN and received about twenty-five circulars. After waiting four or five weeks to let them come in, we made our selection, and about a week thereafter came a letter from Paterson, N. J., containing a circular, which attracted our attention, and had it come to hand in time, the party would probably have sold a wheel. I wrote, advising him to subscribe to and advertise in your paper.

I wish to call your attention to a subject, that of cotton factories—cotton manufacturing in all its branches. For instance, our mill contains 2,400 spindles (will be increased to 5,000), and 45 looms; we turn off 4.5 yards per loom, 44 picks to the inch, 4-4 wide, No. 16½ yarn; we turn off 6 ounces to the spindle per day, No. 16½ yarn. Can any of your Eastern mills beat this? Now we want machinery that will do the most work well, with the least waste; our waste amounts to about 12½ per cent. Give this subject your attention, and I am confident you will see results very satisfactory. Although the above subject has been neglected, still, with all that, your paper is the best the world has produced.

I will write you again, entering into the subject more fully, and enable you to start the wheel.

HENRY G. HALL.

Fayetteville, N. C., Nov., 1866.

[Our correspondent has merely anticipated our own action. We have contemplated for some time giving some attention to the important subject of the cotton manufacture. We can, from our own knowledge of the business, give some items on this subject of a general nature, but possibly our correspondent may, by his contributions, add much to the interest of the matter.—EDS.

### Rifle Practice.

MESSRS. EDITORS:—In perusing an article in your paper of Nov. 24th, on the needle gun, I find Mr. Wiard advances one or two statements which seem to me utterly at variance with my own experience in rifle practice.

In the first place he states that weight toward the muzzle is an advantage, as securing greater steadiness of aim; it may be so, if a man's left arm be of cast-iron, but otherwise it would, especially in rapid firing with a breech-loader, unsteady the hand, by overtaxing its strength, and render good shooting impossible. I have tried both ways, with the weight well forward in a heavy muzzle-loader, with thirty-six inch barrel, which I discarded on that account, partially, for my present weapon, a Wesson breech-loader, which has the weight well back, and which I find infinitely superior to the other both in comfort and accuracy of firing. He also considers a straight stock an advantage, as requiring less muscular effort to bring it into aiming position.

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Now I think if he would try shooting twenty shots, first from a sporting rifle with a crooked stock which should "fit" him, and then with any army rifle, the needle gun, or other (they are all too straight), he would find a decided difference in the comfort and ease of aiming in favor of the former, and immediately abandon his position.

P. S. YENDELL.

Dorchester, Mass., Nov., 1866.

[Our report of Mr. Wiard's remarks on the Prussian needle gun was only a report. We no more indorsed his views than those of any one who presents them before the association. We believe the ideas of our correspondent to be correct. We have had some experience with fire-arms, and do not accept the opinions of any one man as conclusive. In regard to the heavy muzzle, we do not agree with Mr. Wiard, nor in his advocacy of a nearly straight stock. He says that "in the ordinary musket a considerable angle is formed (between the barrel and end of the breech), and in consequence a muscular effort is required to bring the gun into position for taking aim, and the force of the recoil is not so easily resisted.

We believe, with our correspondent, that the angle of the "ordinary musket," instead of being too great, is not enough. Certainly it is easier to bring the eye to a sight when this angle approaches the difference between the hight of the shoulder and that of the eye, than otherwise. As to the recoil, also, we differ from him. In a straight-stocked piece the recoil is delivered from the breech of the barrel directly to the shoulder, while in a curved stock it must traverse the curve of the stock, which then acts as a spring, receiving and holding a portion of the recoil.

Mr. Wiard, however, approved of a straighter stock because it compelled more care in taking aim. We do not agree with him in giving the Prussian needle gun any advantages over American breech-loaders.—EDS.

### Scattering Shot-Gun.

MESSRS. EDITORS:—In your issue of Oct. 27th, a correspondent gives his remedy for a scattering shot-gun. For the benefit of those who may think of trying the discovery, I will give my experience. I was induced to try it on one barrel of a double duck gun with thick barrels, No. 11 gage. I accordingly followed the direction by tinning the muzzle to the depth of a quarter of an inch, then ground it true and even to the thickness of thin card paper. On testing the gun with No. 5 shot, I found the shot not well distributed, but in clusters The tin lining was much grooved and roughened by the discharge. On a second trial, the distribution of the shot was more satisfactory. The third time I discharged with No. 2 shot. The result was, the cross-piece between the muzzles which retains the ram-rod was carried away, and the muzzles, as far as the extent of the tin, expanded out the whole circumference as true as it could be formed by hand; at the same time the interior of the muzzle was restored to its original size. I doubt if in all cases so perfect a bell-muzzle as the gun now has, after removing the tin, could be so easily obtained without incurring the risk of a scattering in the opposite direction to the one aimed at. H. P.

Boston, Nov. 26, 1866.

### Liquefaction of Carbonic Acid Gas.

In answer to the inquiry of a subscriber, we give the following information on the subject of liquefaction of carbonic acid gas. When carbonic acid gas is compressed at the temperature of the freezing point of water, with a power of 40 atmospheres, that is, 600 pounds to the square inch, it liquefies, 500 pints being compressed to the volume of a single pint; consequently the space allowed for the liquefied gas must be only one 500th part of the volume of the gas developed, and it takes exceedingly strong vessels to hold it, as its pressure at our summer temperature is double that amount, namely 1,200 lbs. for the square inch at 90° Fah., a tension far exceeding the resistance of our strongest high-pressure steam boilers.

The apparatus commonly used for the liquefaction of carbonic acid, consists of two very strong closed retorts, made of heavy copper, lined inside with lead, and outside strengthened with iron; one retort serves to receive the charge of bicarbonate of soda and sulphuric acid, the other to receive the developing gas, by means of stopcocks and connecting tube; this retort being placed in ice, condenses the gas to its liquid state. It is a very dangerous experiment when not made with a perfect apparatus. Hervy, in Paris, was killed by the explosion of a very strong iron retort of which the sides were more than an inch in thickness; it burst like a bombshell, by the pressure of the too rapidly developing gas. The enormous rate of condensation will not cause surprise, when we consider that the condensation of steam into water is more than three times as great; namely, to one 1700th part of its volume.

The liquefied carbonic acid gas is lighter than water, on which it floats, and which it freezes at once, when brought in contact with it; it shows in the most exalted degree the cooling properties of all very volatile liquids, as alcohol, ether, gasolin, etc. When drawn from the retort by means of a stopcock, the carbonic acid partially retakes its gaseous state, but in this change it robs so much heat from the remaining liquid, that its temperature descends so low, that its further evaporation is most powerfully checked, and the result is the solidification or freezing of about one-quarter of the gas escaping. This snowy-like substance will retain a temperature of about 100° below zero, Fah., and when it is dissolved in ether and thus forced to melt, the temperature will go lower still (to 140°) for the same reason that the temperature of common ice and snow is lowered (to 0°) by forcing it to melt by the addition of salt. This mixture of solidified carbonic acid and ether will produce the same sensation to the skin as a red hot iron; it coagulates and hardens the blood instantly by the intense cold, producing a blister and intense inflammation.

### European Railway Tariffs.

It appears from a report prepared for the British Royal Commission on Railways, on a comparison of the fares charged per hundred miles on the railways of the principal European states, that the average rates of Great Britain and Ireland for first, second or third-class cars, are greater than on either of the continental lines.

In the first-class carriages traveling is cheapest in Bavaria, where the fare is but $2 25 per hundred miles. This is nearly one dollar less than the aver age first-class tariff of the eighteen countries mentioned. Other states that charge below the average, are Prussia, the Rhine, Sweden, Belgium, Wirtemberg, Denmark, Saxony, Switzerland and Portugal; while Russia, Norway, Spain, Austria, Italy, Holland, France and Great Britain, exceed it. In the last named Kingdom the excess nearly equals the average, the rates being $4 62 per hundred miles.

Traveling in second-class cars is cheapest in Wirtemberg, being 1·66 cents per mile; the English charging nearly four times that amount for the same distance. The average is 2·33 censt—the list of countries exceeding, and those falling short, being, with few exceptions, the same as of the first-class carriages.

The fares in the third-class cars range from 75 cents per hundred miles, in Russia, to $2 00 for the same distance in the United Kingdom; the average is $1 50.

In the report, Prussia, Sweden, Italy, and England, are noted as having express trains, for first and second-class carriages only. Traveling on these trains is enjoyed at an additional expense of two English shillings over the regular fares. It should be stated concerning those countries where charges are so low, that if the roads do not actually belong to the state, the shareholders receive considerable government assistance, in consideration of their being obliged to adopt a low tariff.

A NEW mechanical excitant of vital action is called the "iron treatment." It consists in incasing the limbs in iron "tights" to which one or two thousand oscillations per minute are communicated by machinery. The operation sends the blood to the extremities with almost intolerable force and heat, and must be very easily overdone. Gov. Morton of Indiana, is said to be trying the experiment with apparent benefit.

### MISCELLANEOUS SUMMARY.

A MICROSCOPE, with double the power of any previously constructed, has lately been completed in England, magnifying 15,000 diameters.

TEN or eleven distinct shocks of earthquake were recently experienced at Sorel, C. E., occupying a period of 30 or 40 seconds altogether.

THE Government standard of penetration for the Enfield rifle ball is twelve half-inch elm planks which have been soaked forty-eight hours in water; distance 30 yards.

THE great suspension bridge over the Ohio river, from Cincinnati to Covington, Ky., was opened to foot passengers on the 1st inst. It will not be fully completed for vehicles until the first of January.

THE principle of rotation in tanning vats is again attracting the attention of leather-manufacturers. It is asserted that the action of tannin is increased 500 per cent by keeping the hide slowly moving through the liquor.

THE total earnings of railways in the United Kingdom, says the London *Times*, amount to a good £40,000,000 a year; and if we allow even fifty per cent for working expenses, there will remain £20,000,000 to represent profits.

THE revolution in trade anticipated through the working of the Atlantic telegraph, begins already to be realized. English orders on the California markets for wheat pass under ocean and over land, and advices of the purchase return by the same path, within the business hours of a single day.

A FLOATING railway, the invention of M. Freland, of Bordeaux, has just been patented in France. It is described as likely to be of considerable service in loading and unloading vessels in ports having insufficient quayage accommodation, or where the depth of water does not permit ships of heavy tunnage to enter, except at high tide.

VAST as are the dock works at Birkenhead, the present dock space can be easily increased by some additional 90 acres of water space, with 18,000 yards of lineal quay space, which would afford loading berths of 3,000 feet each to upward of sixty vessels. Upward of a million and a half has been spent in dock works at Birkenhead since 1863.

THE project of a ship canal to connect Lake Huron with Lake Ontario, by way of Lake Simcoe and the Severn river, is again looking up. The county of Simcoe has guaranteed half a million of dollars to aid in the work. By cutting across an isthmus about forty miles wide, the upper lakes will be brought from 300 to 400 miles further eastward.

THE Prussian War Office has published a statement to show that it was not the superiority of the needle-gun, but of the men who carried it, that gave victory to the Prussian arms in the late war. The total consumption of cartridges during the campaign was only seven to each infantry soldier. In the bitterest engagement the highest figure was 13 per man of those present. During the war 900 cannon were brought into play, and each gun fired 40 rounds.

THE New Orleans *Times* announces a large manufacturing scheme in the South-west. The "Chatawa Water Power and Manufacturing Company," organized under a charter from the State of Mississippi, has secured nearly all the water power on the Tangipahoe river, sufficient to turn innumerable spindles. This little stream empties into Lake Ponchartrain, about 30 miles north-west of New Orleans. The first enterprise proposed is a paper mill, which will be pioneer in that part of the Union.

THE Agricultural committee of Sologne, France, has awarded the gold medal offered some time since to the inventor of a process which should enable French wines to be conveyed by land and sea, and preserved in any climate, without alteration in flavor. M. Pasteur, who receives the award, has succeeded in establishing the fact that the heating of ordinary wine to the extent of 50 degrees centigrade, is sufficient to kill all microscopic vegetation, or the ferments by which it is produced, without affecting color or flavor, and to insure the preservation of the wine in closed vessels, for an indefinite period. The various morbid changes in wines are found to be due to various stages or phases of microscopic vegetation, which M. Pasteur has accurately described.

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## NEW INVENTIONS.

The following are some of the most prominent of the patents issued this week, with the names of the patentees :—

THREADING SEWING-MACHINE NEEDLES.—M. B. FOOTE, Northampton, Mass.—This invention relates to an extremely useful implement for the threading of sewing-machine needles, whereby they can be threaded with the utmost ease, facility and rapidity.

STREET LANTERN.—A. R. and E. A. HENRY, Newark, N. J.—This invention consists in forming the supporting frame of a street lantern, for the glass, of cast-iron, and in such a manner that the several parts of the same can be either secured together or taken apart, in a most expeditious manner, and when together, be sufficiently firm and strong for all practical purposes.

VENTILATOR AND PUMP.—J. W. FOARD, San Francisco, Cal.—This instrument is for the production of a partial vacuum by means of a current of air being passed through it, and whereby air or water, as the case may be, may be raised as by means of a suction pump, this instrument constituting a ventilator for the ventilation of ships and other like vessels, chimneys, houses, mines and other places, as also a pump for raising water.

STOVEPIPE ELBOW.—JAMES WILSON, Wilmington, Del.—This invention has for its object to furnish an improved stovepipe elbow, which when choked up by burning soft coal or other soot producing fuel, can be readily cleaned and the soot removed.

ROTARY CUTTING MACHINE.—J. J. BUTLER, Cincinnati, Ohio.—The object of this invention is to so construct a machine that disks of any material may be rapidly cut in the same.

PINS.—R. J. NUNN, Savannah, Ga.—The object of this invention is to construct a pin for securing together parts of garments and other articles in such manner that it will not be so liable to casually slip out of place as the ordinary style of pins.

FORGE ROLLING MACHINE.—HUGH BAINES, Manchester, England.—This invention consists of a perforated movable table, and two or more hollow and perforated rollers, having sectional perforated and engraved rings fitting around the same. These rings are made so as to be easily removed and changed, to forge and roll different kinds of work, according to the patterns engraved, cast or otherwise properly secured upon the rings. The rollers and table are supported by a strong and suitable frame, and worked by reversible gearing or straps.

COMBINED LUMBER PLANING, SAWING, AND TONGUING AND GROOVING MACHINE.—OTIS BRIDGEMAN, Steuben, N. Y.—This invention consists in combining in one and the same machine, a revolving cutter head for planing, a circular saw for sawing, and suitable revolving cutter heads for tonguing and grooving, in such manner, and in such positions with regard to each other, that by properly feeding the lumber into the machine at one end, it will be in turn subjected to the action of the respective parts of the same, one after another, in the order above mentioned, so that when it passes out of the machine at the opposite end, the board will have been planed, sawed, tongued upon one edge and grooved upon the other, and thus ready for use.

ARTIFICAL BREASTS.—JOHN STADERMANN, New York City, and HENRY SAUERBIER, Newark, N.J.—This invention consists in constructing artificial breasts out of wire cloth or wire gauze, swaged or struck up by dies, or other suitable means, in such a manner that the two breasts will form projections on one and the same piece of wire cloth made to conform to the chest of the wearer.

DRYING APPARATUS.—G. D. JONES, New York City.—This invention relates to a new and improved apparatus or device for drying substances, and is more especially designed for drying earthy materials used in the arts which are ground in water or are rendered plastic or tempered in the same, such, for instance, as whiting, clay, etc.

COTTON GIN.—F. M. MCMEEKIN, Morrison's Mills, Florida.—This invention relates to a new and useful improvement in that class of cotton gins in which rollers are employed for separating the lint or fiber from the seed, and which are commonly termed "roller gins," and has for its object the thorough and rapid separation of the lint or fiber from the seed without injuring or breaking the former.

HEAD BLOCK FOR SAWMILLS.—B. F. MCKINLEY, Cincinnati, Ohio.—This invention relates to a new and improved head block for sawmills, and it consists in a novel means employed for operating or moving the knee, whereby the log is set to the saw, and by which the log may be set with accuracy and so as to cause the log to be sawed into boards or planks of varying thicknesses, as may required.

LEVELING OR GRADING INSTRUMENT.—S. L. DONNELL, Spring Creek, Tenn.—This invention relates to improvements in a leveling or grading instrument, and secured to by Letters Patent bearing date September, 11, A. D. 1860, and consists in a novel arrangement and construction of the leveling or grading instrument, whereby simplicity and efficiency are secured and the instrument also susceptible of a much easier and a more ready adjustment of its several parts, as may be desired or found necessary.

BALING PRESS.—G. D. HOWE, Lewisport, Ky.—This invention has for its object to furnish a baling press by means of which two bales may be pressed at the same time, and which may be built and operated in a less space than is required for the presses now in use.

CIRCULAR SAW MILL.—J. A. HOLFORD, Guionsville Ind.—This invention relates to certain improvements in circular saw mills, by which the whole machine will work automatically in all its parts, and by which a log when placed upon the carriage, is cut into boards of the requisite thickness without requiring the least attention from any man.

STUMP EXTRACTOR.—N. M. HEALY, Flushing Mich.—This invention consists in so arranging an upright hoisting bar and levers on an upright frame, and operating them by chains and ropes that a very great lifting power shall be imparted to the bar, thereby enabling one to extract stumps from the ground in a cheap and simple manner.

SPRING TOY.—JOHN H. BROWN, New York City.—This invention relates to a spring toy which is operated by means of a spiral or tension spring in contradistinction to the coiled spring heretofore used. One end of this spiral spring is connected to a cord which winds on a drum provided with a ratchet wheel and pawl in such a manner that by turning said drum the tension of the spring can be regulated at pleasure. The opposite end of the spring connects to a lever which is rigidly attached to the body of the horse, and which is provided with two or more holes to receive the spring in such a manner that by changing the point of connection between said spring and lever the leverage of the spring can be accommodated to the greater or smaller weight of the child occupying the toy. By the use of said lever the hind legs are relieved from all strain, and a strong and durable toy is obtained.

GRINDING MILL.—JOHN M. MILLER, Hamilton, Ohio—This invention consists in the arrangement of a suction blower in combination with the case inclosing the millstones of a grinding mill, and with a suitable receiver in such a manner that by the action of said suction blower the dirt, flower, vapor, and hot air created by the action of the grinders are removed and the grinders enabled to work free and without danger of heating. Suitable slides in the case serve to regulate the power of the draft created by the suction blower, and the receiving box into which the dust, vapor, etc., are driven, is provided with an escape opening for the wind.

CAST-IRON CHAIN PULLEY.—JAMES BIRD, New York City.—The object of this invention is to construct chain pulleys in such a way that they will be more enduring and better able to resist the wear to which they are subjected.

TWEER IRON.—T. E. C. BRINLEY, Louisville, Ky.—This invention consists in the combination of hooks secured to the cap of a tweer iron with lugs or ears secured to the side of the body or chamber of the tweer so that the cap may be readily removed in order that access may be had to the interior of the air chamber for the purpose of removing the cinders that may have collected there.

BRICK MACHINE.—WILLIAM C. BARTOL, Huntingdon, Pa.—This invention consists in an improved brick machine so constructed and arranged that the empty molds may be raised automatically from the lower to the upper part of the machine and lowered, passed beneath the hopper, filled, and passed out upon shelves at the other end of the machine ready for removal to the drying floor, while the machine is being drawn back and forth between the clay pit and drying floor.

SLED BRAKE.—R. B. DUTTON, Iron Hill, Iowa.—This invention consists principally in the combination and arrangement of the jointed dog clasp, lever, fulcrum rod, ratchet bar, and spring with each other and with the rave and runner of the sled.

JEWELING WATCHES.—A. C. CROSBY, Union, Pa.—This invention is designed to facilitate the setting of jewels in watch plates by avoiding the comparatively tedious burnishing operation and forming the burr over the jewel at a single operation.

BRACES FOR WAGON SPRINGS.—JAMES H. LOCKIE, Humphrey, N. Y.—This invention has for its object to prevent the backward and forward swaying and the consequent twisting and breaking of wagon, carriage, and buggy springs.

ROLL CARDING MACHINE.—GEORGE BRUCE, Corydon, Ind.—This invention principally consists in the simplicity and novelty of the feed works, they being so constructed as to be nearly automatic in their operation of spreading and feeding the wool from the apron to the machine, and to require but little aid or assitance.

PROPELLING HORSE.—JOHN H. BROWN, New York City.—This invention relates to a propelling horse, the front wheel of which is placed out of the center so that by its action the cantering motion of a horse is imitated. The hind wheels are rigidly attached to a double crank shaft and the cranks connect with two hand levers in such a manner that by the action of each hand lever the tractive power of both wheels is utilized and the horse can be propelled with considerable speed. The hand levers pass through the body of the horse, which also incloses the connecting rods and cranks, so that the propelling mechanism does not interfere with the child's limbs or clothes.

WASHING MACHINE.—E. BECKWITH, Smith Pass, Ill.—The object of this invention is to provide a machine by which fabrics may be washed easily and in the most perfect manner and without injury.

MANNER OF ATTACHING HANDLES TO TEAPOTS AND OTHER VESSELS.—JOHN H. BROWN, New York City.—This invention has for its object the attachment of handles to teapots or other vessels of similar nature in such a manner that the said handle can be freely turned on its bearings, while the pot is standing, but as soon as suspended on the handle it will not be able to swing free.

CIRCULAR SAWING MACHINE.—LEWIS FOSSEE, Jeffersonville, Ind.—This invention consists in devices to operate in connection with a circular saw for sawing plank with beveled edges or with curved edges or sides when required, as well as straight edges and sides. The machine is particularly designed for use in ship yards for edging plank of all kinds, and sawing in curved lines and outrage, so that bottom plank of vessels may be finished upon the circular-saw table.

OIL CAN.—WILLIAM C. NEWKIRK, Piqua, Ohio.—This invention consists in constructing an oil can in such a manner that coal oil and other oils or liquids of like nature can be handled and used without the disagreeable necessity of soiling every spot where the oil can is placed, as is almost invariably the case with the common oil can.

CORSET.—MRS. CLEMENTINE D. RUTHERFORD, Brooklyn, N. Y.—The object of the present invention is to so construct and form the corset, that while sufficient support is imparted by it to the waist and form of the person by whom it is worn, yet it will be comfortable and cool to the wearer; such corsets being especially adapted for use during the summer season.

CORN PLANTER.—J. G. WALKINSHAW, Leavenworth, Kansas.—This invention relates to improvements in the construction of an implement for planting corn, and consists of devices for dropping the corn evenly in hills at regular distances apart, in connection with an arrangement for dropping at the same time either a small quantity of guano or other similar fertilizing material, or planting beans with corn.

SPRING BOTTOM FOR SEATS, ETC.—WM. J. HASWELL, Waverly, N. Y.—This invention relates to a bedstead or other frame, the side and end pieces of which are slotted and provided with a series of rollers. Over these rollers are drawn a series of straps which connect at their upper ends with a piece of canvas or other suitable flexible material, and at their lower ends with springs retained by rods which extend along the lower edges of the side and end pieces of the bedstead, being retained by suitable buttons. By these means a bottom for beds, chairs, sofas, etc., is obtained, the tension of which can be easily regulated, and which is free to accommodate itself to the form of the body.

STEAM VALVE.—G. G. HUNT, Bridgeport, Conn.—This invention has for its object the construction of a valve in such a manner that it will serve as a perfect regulator as regards the admission of steam to the cylinder of an engine, and admit of the governor operating perfectly to regulate the admission of steam, when applied to an engine of any size and power.

COAL SCUTTLE.—EDGAR ELTINGE, Kingston, N. Y.—This invention relates to an improvement in the construction of coal scuttles, and it consists substantially in providing them with self-adjusting covers or shields, having on their sides flanges that extend over and outside the edges of the scuttles, as low as desirable, for the purpose of controlling and guiding the coal or other contents of the scuttles to the place of discharge, preventing it from passing over the sides of the scuttles. The covers or shields are hinged to ears which also hold the ends of the bails.

WATER WHEEL.—SAMUEL HICKS, Orangeville, Ind.—This invention relates to a new and useful improvement in that class of water wheels which are placed on a vertical shaft, and are commonly termed horizontal water wheels. The invention consists in a novel manner of constructing the wheel and the scroll, and arranging said parts within a penstock, whereby a very simple, economical, and efficient wheel is obtained, one which will give out a large per centage of the power of the water, and will operate favorably in back water.

SCHOOL AND FAMILY SLATE.—JOHN H. FRENCH, Geddes, N. Y.—This invention relates to a slate, the frame of which is made in two compartments, one of which contains a slate, while the other is so constructed as to admit of the insertion of any convenient number of cards of pasteboard, paper or other material, upon which are printed, drawn, painted, or photographed lessons or copies for writing, printing, marking, or drawing, and exercises in arithmetic, either, any, or all combined in such a manner that the pupil is enabled to copy the lessons upon the slate in the other part of the frame below, and that he has a great variety of exercises always in convenient reach. The operation of copying the lessons is materially facilitated by horizontal, perpendicular, or slope lines, permanently pressed, drawn, marked, stamped, printed, ruled, or cut upon a part or the whole of one or both surfaces of the slate as guide lines, whereby the pupil is enabled to make his letters, figures, or drawings of the proper proportionate hights, widths, and slope.

SELF-REGULATING TENSION.—THEODORE ZINCK, New York City.—This invention relates to a tension, which is applicable to the thread of sewing machines or to ropes, telegraph cables, or other strands which are wound off from a bobbin, and the tension of which is to be kept as nearly as possible uniform. Said tension consists of a friction spring bearing on the bobbin from which the thread or strand is to be unwound, in combination with an arm which is secured to the spring, and over which the thread or strand passes, in such a manner that whenever, from any cause whatever, the tension of said strand increases, the friction spring is forced back and the bobbin is relieved, and by those means the tension is equalized and rendered self-regulating.

PISTON PACKING.—BARKER LOWE, Fall River, Mass.—This invention relates to a piston packing in which a spiral spring is used, which is beveled off from the center toward both ends, so that the operation of inserting the spring in its place is facilitated. The rings which surround the spring are so formed that they in case the head and follower of the piston, and they are provided with an internal flange which is surfaced to the inner surface of the head or follower, in such a manner that the escape of steam is prevented, and the head and follower are not allowed to come in contact with the cylinder.

## Business and Personal.

D. W. Johnson, 469 Broadway, wishes a good second hand hydraulic press, of three to four hundred tons.

J. J. Detwiller, Easton, Pa., wants market for large quantities of kaolin or china clay.

V. H. Lyon, Plainfield, Ind., wishes to obtain one of Powell & Lealand's Microscopes, described in Vol. 12 SCIENTIFIC AMERICAN.

Information upon enameling castiron is requested by Jno. B. Overton, Frederick, Md.

J. E. Treat, Oxford, Mich., wants to become an engraver; wants to put himself under the instructions of an engraver; wants the address of all glyphographic engravers; also wants the address of all engravers generally.

Where he can learn Scientific farming is asked by J. E. Peaslee, Dover, N. H.

W. S. T. wants to purchase the best Peat Machine, and thinks that if owners of such machines would advertise in the SCIENTIFIC AMERICAN, they would find it to their advantage.

Makers of Morrison's Shingle Machine please address, H. P. Guilford, Reading, Mass.

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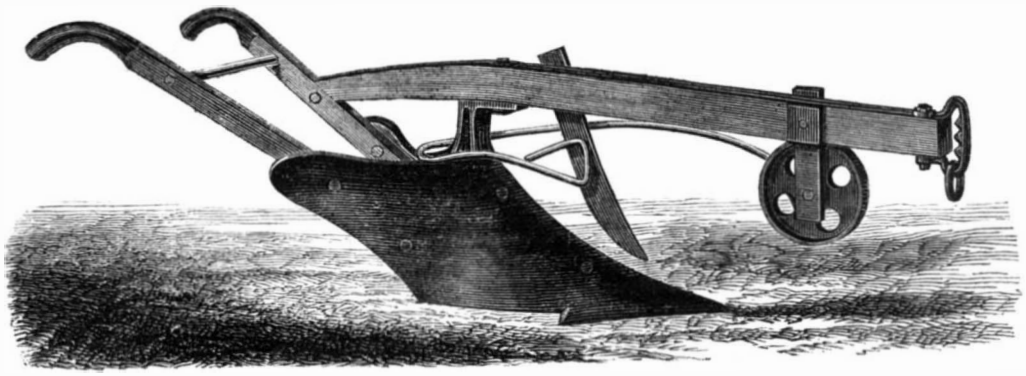
### Device for Clearing Stubble from Plows.

In using the ordinary plow, especially on stubble fields, or in heavy grass land, the angle between the colter and beam frequently becomes choked to such an extent as to raise the share from its proper depth, and necessitate stopping the team and removing the obstacle by hand. In the accompanying engraving there is represented a very simple contrivance designed to remedy this difficulty.

In the guide wheel is placed a stud or pin, which forms a crank, and to this pin is pivoted the end of a rod of iron, which is carried along under the beam and around the lug of the share to the colter, as seen in the engraving. As the guide wheel rotates, a reciprocating with a vertical motion is given to this vibrating rod, so that as the rod advances to the front of the colter edge it pushes the stubble from the blade and throws it down into the furrow.

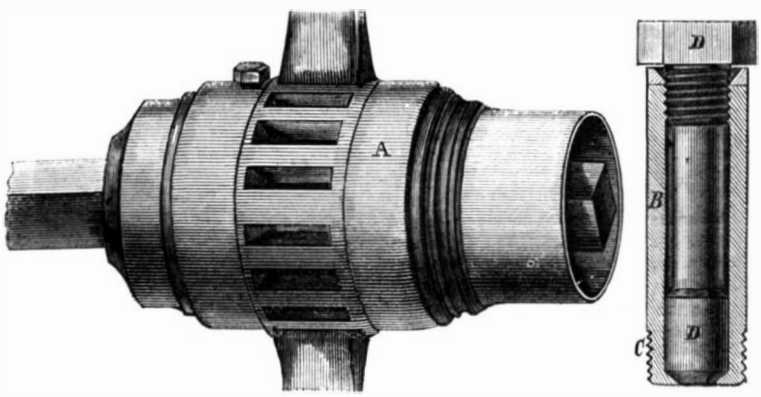


VEBER'S COLTER CLEARER.

Patented through the Scientific American Patent Agency, September 25, 1866, by William Veber, Jr., Shingle Creek, St. Lawrence Co., New York, whom address for further facts.

### Device for Lubricating Axles of Vehicles.

This engraving represents a new device for applying oil to the axles of vehicles, without the usual troublesome and laborious operation of taking off the wheels. It is very simple and effective, accomplishing the delivery of the lubricating material upon the axle as certainly as if the wheels were removed. A vehicle provided with it can be lubricated in two minutes' time, by a single person, whether standing in the shed or on the road. It saves oil as well as labor and time, and it renders the process of oiling a wagon neat and clean, and vehicles provided with it will doubtless be oiled much oftener, and wear much longer for that reason. A represents the hub of a carriage with the lubricating apparatus inserted, showing only the cap; B represents a section of the apparatus itself, which is secured to its place by the screw thread, C. To lubricate a vehicle, the cap and piston, D, is unscrewed and removed, and the oil introduced through the tube, which is of the same diameter inside the whole length except just at the bottom, where it is finished like a valve seat. The cap and piston is then replaced and screwed fast, which presses the lower part of the piston tight against the bottom of the tube, preventing the oil in the axle-box from returning. As frequently the oil is thick (being congealed by cold and other causes), the lower part of the piston is made to fit the tube exactly, and when the oil is placed in the tube, the replacing of the piston and cap will always force the oil through the hub and deliver it on the axle. This improvement can be easily applied to any vehicle, old or new, and would not weaken or disfigure any wheel, even of the finest carriage; and, being of very moderate cost, will doubtless prove popular.




PARSONS'S DEVICE FOR LUBRICATING AXLES.

It was patented November 27th, 1866. Rights are for sale. For further information, address the Patentee, Geo. W. Parsons, 424 Market St., Harrisburg, Pa.

### Life of Steel and Iron Rails.

An examination of the steel rails laid down two years and a half since in the Woodhead tunnel of the Manchester, Sheffield and Lincolnshire railway, resulted in a striking illustration of the relative endurance of steel and iron rails. This tunnel is about three miles long, with a station at each end, where trains generally stop, and where the wear of the rails is extraordinary, from the starting of heavy trains with the aid of sand on iron constantly wet with drippings from the roof. The life of an iron rail at these stations was but about five months on one head, and three or four months on the other after turning. The new rails are 75 lbs. Bessemer steel, double-headed, 2½ inch face, ⅝ inch stem, and 5 inches deep. Rails were taken out at the places of greatest wear, at each end of the tunnel, and on being carefully measured and compared with the original templates from which they were made, were found to have lost as nearly as possible one-eighth of an inch in the thirty months' use under at least 8,000,000 tuns of traffic as computed from the books of the station. The rails were in admirable condition, and good for five times as much further wear, both heads together; making, in insurance phrase, an "expectation of life," equal to fifteen years, or *twenty times* as long as that of iron.

### Coffee and its Adulterations.

The report of the Internal Revenue Commission shows that the usual yearly consumption of coffee in the United States has been about 200 millions of pounds. Allowing the small modicum of one quarter of a pound per week to each person using coffee, it is seen that the number of coffee-drinkers in the whole country can hardly exceed fifteen millions, or less than one half the population. But the consumption of coffee in the four years, 1862-5, averaged only half the usual amount, owing, in great part, to the extensive adulteration compelled by the war prices. Chiccory root, peas and rye, are familiar ingredients of artificial coffee; burnt bread-crust is also a well-known domestic substitute, and the Revenue Commission has revealed the important fact that all kinds of spoiled, condemned, and refuse bread, and especially the surplus stock of stale black bread brought ashore by emigrants from Europe, supply a favorite material for adulterating both coffee and black pepper. Unmerchantable or very inferior sugar and molasses are also collected and reduced to caramel for the purpose of coloring the adulterations of coffee. These de-appetizing considerations will probably send the consumers of ground coffee in a rush to the hardware stores where hand coffee-mills are sold. The properties of the grand ingredient, chiccory, if understood according to the medical authorities, would lend additional impulse to the hand-coffee-mill trade. Prof. Johnston says that its prolonged use produces among other things, heart-burn, loss of appetite, nervous affections, constipation with intermittent diarrhea. A writer in the *Journal of Materia Medica*, gives observations showing its decidedly aperient effect; for which, in fact, it is in domestic use in France and Germany. This tendency, in connection with the presence of cholera, and in view of the free and universal use of the chiccory-coffee among the poorer classes, seems to deserve the careful attention of the sanitary authorities.

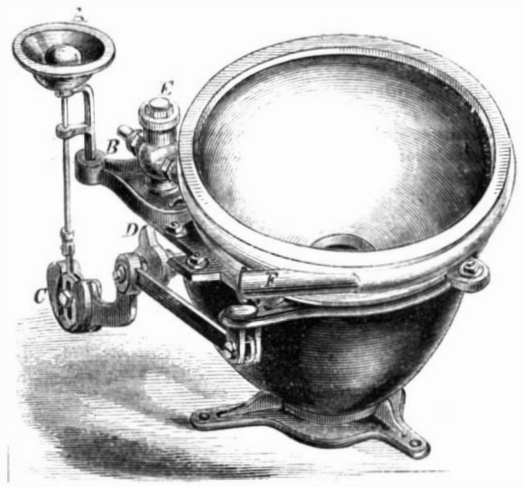
### Practical Hints.

To Clean a Foul Gun.—I hand you the following as a reliable fact—the reason I leave to others. In hunting, a gun often becomes foul from use, and the exploding of a cap will fail to ignite the powder. With a knife sharpen a piece of dry pine wood—or common match wood will answer; drive the splint right into the nipple of the gun, cut off the bruised part of the wood even with the top of the nipple; put on a cap, and it will not fail to explode the gun. Any one wishing can test this by putting a little powder in his gun, then driving snugly the plug—it will go every time. For a reason.

Quien Sabe.

### WELLINGTON'S PATENT WATER CLOSET.

"Modern Improvements" comprehend all appliances that tend to the convenience and advantage of man. Among these is the water closet in dwellings and offices. The one herewith illustrated seems to be admirably adapted, from its simplicity, to security against injury, unfailing operation, cleanliness, and freedom from noxious effluvia.




The cup, A, can be raised or lowered to adjust it to any hight by a set screw, not shown, in the projection, B, and the pull lengthened or shortened by adjusting the bolt in the slot of the weight, C. The stop, D, prevents turning the pan more than 90 degrees, sufficient to entirely empty it. The water is introduced through the pipe and valve, E, shown as disconnected with the bowl pipe, F. The valve is always, in this closet, directly under the seat and in front, so that it can be reached for repairs without disturbing the wood-work and without disconnecting the supply pipes. No water stands in the pipe between the valve and the bowl, as, immediately after using, the water runs into the receiving pan. The drippings from the couplings also all find their way to the same receptacle, so that there can be no disarrangement of the parts in moving, nor any annoyances from leakage in use. The manufacturers make every part in duplicate, and when repairs are needed, parts can be readily obtained which absolutely fit.

Patented Nov. 15, 1859. Hayden, Gere & Co., 84 Beekman street, New York, are the manufacturers, to whom orders should be addressed. Dalton & Ingersoll, 19 Union street, Boston, Mass., can furnish the closet.

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THE
# Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ American and Mexican News Company, Mexico, are Agents for the SCIENTIFIC AMERICAN.

☞ Messrs. Trubner & Co., 60 Paternoster Row, London, are also Agents for the SCIENTIFIC AMERICAN.

☞ "The American News Company," Agents, 121 Nassau street, New York.

VOL. XV., No. 26 [NEW SERIES.] *Twenty-first Year.*

NEW YORK, SATURDAY, DEC. 22, 1866.

**Contents :**

(Illustrated articles are marked with an asterisk.)

*Bell's Patent Steam Generator ..... 419
Bayliss's Tweer Iron..... 419
Tea Culture in America..... 419
Fogs, Clouds, and Rain in the Mountains..... 420
The Cultivation and Uses of Forest Trees..... 421
The McCall and Sloper Process for Preserving Fresh Meats..... 421
American Institute — Polytechnic Branch..... 422
The Law of Mariotte—Its Relation to the Liquefaction of Gases..... 422
Area of Steam Ports..... 422
The Canada Gold..... 422
To Measure Belting..... 423
*Position of the Piston when the Crank is Vertical..... 423
Goulding's Patent..... 423
The Cotton Manufacture..... 423
Rifle Practice..... 423
Scattering Shot Gun..... 423
Liquefaction of Carbonic Acid Gas..... 424
European Railway Tariffs... 424
Miscellaneous Summary..... 424
New Inventions..... 425
*Veber's Cotton Cleaner..... 426
*Parsons's Device for Lubricating Axles..... 426
Life of Steel and iron Rails.. 426
Coffee and its Adulterations. 426
Practical Hints..... 426
*Wellington's Water Closet. 426
Expiring Subscriptions..... 427
No. 1 Advertisers..... 427
Bring Out your Inventions.. 427
Important Suggestions..... 427
The Value of a Scientific and Mechanical Journal..... 427
Improved Pier and Warehouse System for New York ..... 427
Volkman's Self-holding Plow 428
Patent Claims.....428, 429, 430, 431
English Patents..... 431
Patent Office..... 431
Prospectus..... 431
Advertisements.....432, 433
Index.....434, 435, 436, 437, 438

## EXPIRING SUBSCRIPTIONS.

The present number closes the volume, and in accordance with our usual custom, we discontinue the paper upon expiration of the time for which the subscription was paid. We expect to keep all our old subscribers, and to add largely to our list on the new volume.

## NO. 1 ADVERTISERS.

Parties who intend to advertise on the outside page of the first number of the new volume, should send their advertisements without delay. The terms are seventy-five cents per line for each insertion. To enable advertisers to calculate how much they must remit, we will state that, independent of the head line, about seven words will make a line of agate type. It will be safe to estimate but four words for the head line.

Engravings will be inserted with advertisements at $1 a line for the back page and 75 cents a line on the inside. The rates for ordinary advertisements in the inside, 40 cents a line.

## BRING OUT YOUR INVENTIONS.

The enlargement of the SCIENTIFIC AMERICAN, commencing with the next issue, will enable us to insert in each issue a much larger number of engravings than our limited space has heretofore admitted. We have increased our force of designers on wood, so that orders for engraving of new inventions and machines can be filled more promptly than heretofore.

There is no way in which any new invention can be so extensively and advantageously brought to the attention of the public as by having good engravings of it published, with a description, in the SCIENTIFIC AMERICAN. Thousands who have tried it can testify to this fact.

To patentees, and those who wish to have their inventions illustrated in this Journal, the following general directions will be their guide :—

In preparing engravings for publication in the SCIENTIFIC AMERICAN, the use of a model from which to make the design, is preferred. If it is inconvenient, however, to send a model, a well-executed photograph, taken from a machine or model, will usually answer the purpose. The Letters Patent should be sent with a statement of the advantages claimed for the invention. After the order is received the engraving will be prepared and published, and the model, patent, and engraving returned by express. For further information address Publishers of this paper.

## IMPORTANT SUGGESTIONS.

The enlargement of the SCIENTIFIC AMERICAN will enable us to publish all the patent claims in each regular issue, and obviate the necessity of the extra claim sheet, which we have lately been obliged to add.

Other important improvements are to be made which will render the paper more attractive than any publication of its class heretofore published. Subscribers, whose time expire with this issue, should renew their subscription at once, so as to be sure of all the numbers.

We shall endeavor to print enough of the few first numbers to supply all demands, but the great rate at which new subscribers are coming in renders it difficult for the Publishers to determine the extent of the edition to print at first.

## THE VALUE OF A SCIENTIFIC AND MECHANICAL JOURNAL.

Before the advent of railroads and the establishment of the telegraph, when travelers went from point to point by the stage-coach or by private conveyance, information was as slow and uncertain in transmission as passengers. The knowledge gathered by one man, under circumstances and by experiences not common, but liable to all, was his own personal property to be transmitted to his children, or mayhap to die with him. There were secrets in every trade and profession (there are too many now), and he who obtained the lore gained from the niggardly teacher, experience, was compelled to pay a price wrung from his golden years and laborious sinews.

To a certain extent this is true now, but knowledge is like the water poured into an overflowing bucket. He who has not capacity to hold, or capability to use, must let it go from him, although when it has only moistened his lips, it fills and satisfies others. Mystery in mechanics has had its day. The cabalistic formulæ of the chemists have been interpreted, and all who choose, may walk the road of knowledge, gleaning here and gathering there ; in fact, stopping at stations by the way, and drawing from magazines filled with the experiences of ages and enriched with the experiments of those who have but just preceded them.

These magazines of valuable information for the scientist and mechanic, are the journals devoted to scientific and mechanical subjects. In these the stray and floating particles of knowledge are gathered, sifted, and presented in their real character. If some of them are but froth on the sea of knowledge, they are dissipated in the rays of true science ; if real and valuable, they are divested of the barnacles of prejudice, egotism, persiflage, and trash, and shown as they really are.

This work of sifting, choosing, and preparing is the proper business of the journalist—the editor of a scientific paper. He saves the seeker after knowledge from the dreary labor of searching records, the impossible task of endless correspondence, and the continual inquiry after "some new thing." To the scientific student, the beginner in mechanics, the seeker after the hidden wisdom of nature's laws, and the practical worker in accordance with those laws, the scientific and mechanical periodical is an ever-present friend and assistant. It saves him hours of hard thinking, days of fruitless labor, the shame and vexation of unaccomplished endeavor, and periods of weary waiting. It assists him in his attempts at discovery, unravels hard knots in his line of theory, gives him valuable hints in his attempt to use the forces of nature, shows him his error, and points to the right road. By knowing the errors and failures of others, he is enabled to steer clear of obstacles, or by understanding the methods used by others, he is assisted in surmounting them. If a practical man, he is periodically informed of what is being done in his specialty, and thus kept from wasting his energies on labors already accomplished, and is enabled to utilize the brains and labors of others. In short, a "live" mechanic must as certainly keep up with the times as a politician or a statesman. To do this there is but one course, and that is to read a journal which is devoted to the recording and elucidating of the truths necessary for him to know.

## IMPROVED PIER AND WAREHOUSE SYSTEM FOR NEW YORK.

The pending legislative inquiry into the harbor accommodations of our great seaport cannot be considered premature. The character of its wharfage is a drag and a disgrace to the prosperity of a commercial metropolis like this. Rude, primitive, rotten structures of logs, crowded and choked, exposed and insecure, infested with thieves, and more or less embanked with ship-stranding mud, are not the sort of accommodations to which the commerce of the world should be invited. The want of proper space and apparatus prolongs the discharge and taking in of cargoes, often four-fold. The entire absence of wharf storage involves a constant waste of time and expense, and an aggravated obstruction of the streets, in transporting merchandise back and forth between the shipping and the warehouses. Warehouses scattered all over town, and interspersed among other buildings, hazardous in every degree, involve the frequent destruction of vast amounts of merchandise by fire. The ill-constructed water-front promotes instead of preventing the obstruction of the docks and channels, and the detention of a pestilential sewerage. The whole system, wretched as it is, instead of being a profit, is a constant expense to the city treasury.

It is to be hoped that the labors of the legislative commission will not be completed without the adoption of a mature system of wharfage, uniform, and adequate to meet the wants and remedy the evils now so severely felt, together with a business-like plan for carrying the improvement into effect without creating inordinate monopolies, whether moneyed or municipal.

The comprehensive and convenient plan of wharf structures put forth by the projector of "The New York Pier and Warehouse Company" (Mr. G. Burrows Hyde), seems eminently worthy of consideration. It may be stated in a very few words. A continuous bulkhead of durable stone masonry is to define the water front, and act as a deflector for the discharges and deposits which now accumulate in the slips. Piers are to be built of prescribed dimensions, according to the requirements of the channel and tides, resting upon great hollow pillars of iron, exhausted and driven down by pneumatic pressure, and then filled with masonry or concrete under pressure, so as to form artificial stone. The space between these pillars will allow a free flow of the tides and deposits, and will be sufficient also to admit of dredging. The pier will support a fire-proof warehouse of iron, five stories high : the first story, on the street level, being open on all sides as a wharf, yet covered from the weather, and capable of being securely closed at night by iron gates or rolling shutters, and furnished with steam hoisting apparatus for the rapid discharge and loading of vessels, and dispatch of carts. The second floor may be used, where necessary to avoid obstructing the pier, for the temporary deposit of goods awaiting stowage or removal ; and the whole warehouse proper will afford secure storage for merchandise, on the spot, to any required extent, at the least of expense and inconvenience to parties or the public. The steam, always up in these warehouses for hoisting purposes, would also be available in connection with powerful stationary fire engines, for extinguishing fires among the shipping, which have been so calamitous in repeated instances. Wharf thieving and smuggling could also be effectually circumvented. It is evident that the profits of warehousing and wharfage on this plan would attract abundant capital for the construction of the buildings, in accordance with proper legislative regulations, and

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under a profitable water rent to the city. Thrown open on safe and liberal terms to the enterprise of all, in lots of some limited extent, and under supervision of government, a perfect system of piers and warehouses may be made a public benefit without becoming a public charge, a center of monopoly, or a source of corruption.

The trouble now-a-days with about every new project of a public character, is, that the promoters start off with a gigantic stock operation; we have heard this objection raised to the New York Pier and Warehouse Company's scheme, which we hope is not true.

### Volkman's Self-holding Plow.

Our attention has recently been called to a novel self-holding plow which seems to possess much merit. The peculiarity of the plow is such that the share will keep in the furrow without being guided. A boy old enough to drive a team is capable of managing the implement; or rather the plow will take care of itself without the attention of the driver. The share and beam are similar in construction to the ordinary plow. The front end of the beam rests in a light carriage and is so arranged as to turn freely in every direction. When in use, the plow is set so that it points slightly toward the land side, the draft being from the opposite direction, which renders it impossible, with the arrangement for supporting it in position, to be thrown out of the furrow unless it strikes some obstruction, and then as soon as passed it resumes its former position. Any depth may be plowed by setting the implement the desired scale before starting.

If we are not mistaken Mr. Volkman's patent plow will come into quite general use. For further information see advertisement in another column.

LYNN contains 220 manufactories, turning out an aggregate of not far from twelve million dollars' worth of boots and shoes, annually.

THE Agricultural College of Massachusetts is to be opened for students on the first of September next. Five buildings are to be erected, including a chemical laboratory and a model barn, at a cost of $65,000.

THE exhaustion of the British coal-fields proceeds at the rate of nearly one hundred million tons per annum, or five times the present product of the American mines. On the other hand, the extent of the American coal-fields is more than twelve times that of the British.

AN extensive system of adult schools has been inaugurated in France, under the auspices of the Minister of Public Instruction. Last winter, nearly 5000 such schools were opened, with 30,000 teachers, and about 600,000 pupils of both sexes; nearly half of whom were unable to read.

PITTSBURGH contains five hundred large manufacturing establishments. It has fifty glass factories and sixteen potteries, forty-six iron founderies, thirty-one rolling-mills, thirty-three machinery establishments, and fifty-eight oil refineries; beside miscellaneous works of almost every variety; the whole turning out an annual product worth $100,000,000.

THE Public School System of Lower Canada, by a recent report, comprises 10 universities and professional institutions, with 818 students; 210 secondary institutions, as classical and industrial colleges and academies, with 28,613 students; 3 normal schools; 4 special schools; and 3,479 primary schools, with 172,733 pupils. The total amount levied for the support of this system, in 1865, was nearly $600,000.

SUBTERRANEAN PHOTOGRAPHY.—A firm in Cincinnati have obtained the exclusive right of taking views in the Mammoth Cave of Kentucky, for five years. The process successfully used in taking pictures of the interior of the Great Pyramid is adopted, using the magnesium light. The dampness of the cave, the smoke arising in the consumption of large quantities of magnesium, the divergency of the artificial light, and the magnitude and proximity of the objects to be photographed, present a number of serious difficulties. Powerful reflectors are used to throw a flood of light upon the object, and the plate is allowed about twice the exposure required by the light of the sun.

## ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING DEC. 11, 1866.

*Reported Officially for the Scientific American.*

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

**60,319.—HAME FASTENING.—W. J. Alexander, Manchester, Iowa.**

First, I claim the hame fastening consisting of the catch piece, B, and the socket, C, with the spring catch, D, and notches, E, respectively, and united to the loops of the hames, substantially as and for the purpose described.

Second, The arrangement of the button, F, shaft, G, eccentric, H, and spring, M, operating as described.

Third, The pin, L, as and for the purpose described.

**60,320.—MANUFACTURE OF BRICK OR BUILDING BLOCKS.—Henry W. Angell, Waukesha, Wis.**

I claim a brick composed of lime, sand, small stones, and gravel, prepared and molded in the manner described.

**60,321.—SAW.—James E. Atwood, Trenton, N. J.**

I claim the teeth, H H, when inserted and secured in the manner herein described and for the purposes set forth.

**60,322.—MACHINE FOR ROLLING METAL.—Hugh Baines, Manchester, England.**

First, I claim the combination of the hollow perforated rollers, c*, with the reversible gearing, H* I*, when constructed, arranged, and connected together so as to operate substantially in the manner described and for the purposes set forth.

Second, In combination with the above, the movable table, 7, arranged and operating substantially as and for the purpose specified.

**60,323.—BRICK MACHINE.—William C. Bartol, Huntingdon, Pa.**

First, I claim operating the machinery for molding brick from the drive or supporting wheel or wheels of the machine, substantially in the manner herein shown and described.

Second, The combination of the slides, H, racks, C', cog wheels, G, and shaft, D, with each other, substantially as herein shown and described, for the purpose of raising and lowering the shelves and molds, as set forth.

Third, The combination of the catches, E', spring, G', and arms, H' I', with each other and with the racks, C', and wheels, G, substantially as herein shown and described and for the purpose set forth.

Fourth, The combination of the racks, A', and cog wheels, I, with each other and with the molds, J, and shaft, D, substantially as herein shown and described and for the purpose set forth.

Fifth, The combination of the pins, B', connecting rods, M', pivoted levers, K', and springs, L', with each other and with the projections, J', of the racks, C', substantially as herein shown and described and for the purpose set forth.

**60,324.—BATTING AND WADDING.—Samuel Baxendale, Boston, Mass.**

I claim the batting or wadding composed of a layer of fibrous material attached by any adhesive substance to opposite sides of a sheet of paper, as herein described, the same being a new article of manufactnre.

**60,325.—ROAD SCRAPER.—J. B. Beall and B. F. Grime, Westerville, Ohio.**

First, I claim, in a reversible road scraper, constructing the latch, c, to a loosely-turning handle piece, b', by means which will allow of the movement of said latch by turning the handle piece without removing the hands from either of the handles, substantially as described.

Second, The combination of a vibrating latch, c, a sliding spring latch, d, and a movable hand piece, b', substantially as described, with a reversible scraper.

**60,326.—WASHING MACHINE.—E. Beckwith, South Pass, Ill.**

The combination of the pendulum, J, with the bar, K, counterpoise, L, uprights, G, and rubber, E, substantially as and for the purpose herein shown and described.

Second, I claim the levers, C, in combination with the board, B, and rubber, E, all constructed and operating substantially as herein shown and described.

**60,327.—APPARATUS FOR DISTILLING GRAIN.—J. B. Beebe and T. F. Lloyd, Albany, N. Y.**

First, We claim the generator, C, constructed with two or more chambers, C' C'' C''', for the purpose set forth substantially as described.

Second, We claim the drop pipe, l, in combination with the encasing pipe, h, for the purpose set forth substantially as described.

Third, We claim the indicator, E, combining the pipes, n n' and q, together with the permanent hydrometer, x, and thermometer, t, the bell glass or dome, o, and the cock, r, for the purpose set forth substantially as described.

Fourth, We claim the combination of the registering meter, s, or its equivalent, with the indicator, for the purpose set forth substantially as described.

**60,328.—SOAP.—S. J. Beeler, Wales, Ill.**

I claim the use of the ingredients herein named in the proportions and manner substantially as set forth, for the manufacture of soap.

**60,329.—CAST-IRON CHAIN PULLEY.—James Bird, New York City.**

I claim, in cast-metal chain pulleys, making their projections, which hold the links of the chain, with a "chill," substantially as and for the purpose above described.

**60,330.—MASH MACHINE.—M. Brand and C. P. Hoffmann, Chicago, Ill.**

First, We claim the adjustable scraper on bottom of tub.

Second, The vertical propeller-shaped wings in combination with the machine.

**60,331.—FENCE GATE.—W. W. Bratt, Ottawa, Ill.**

First, I claim the two rollers, G G, on which the gate slides sidewise.

Second, The guide board, K, fitting in the circular grooves of the rollers, G G.

Third, The guide, I, at the lower end of the swinging post, B.

Fourth, The part, L, of the gate, H, back of the rollers, G G, lying against the fence when closed, substantially as and for the purpose described in the foregoing specification.

**60,332.—PLANING MACHINE.—Otis Bridgeman, Addison, N. Y.**

First, I claim the arrangement of the cutter head, K, adjustable rollers, A3, saw, N, feed table, U, cutter head, S and T, frame, L2, and its flange, S2, strip, P2, screw shaft, O2, arms, A3, and feed rollers, V2, substantially as described for the purpose set forth.

Second, The arrangement of the frame, L2, carrying the circular saw blade, N, and revolving cutter head, suitable either for tonguing or grooving, substantially as described and for the purpose specified.

**60,333.—TWEER.—T. E. Brinley, Louisville, Ky.**

I claim the cap, E, provided with a flange, a, and hooks, e e e, body, A, with the raised center forming an annular air chamber, C, and ears, n n n, when arranged as herein set forth, and operating as and for the purpose specified.

**60,334.—GRATE FOR STOVE.—Albert Brown, Troy N. Y.**

First, I claim the permanent bar, G, in combination with the frame, F, and convex center, E, or equivalents, as and for the purposes specified.

Second, I claim the cavity, C, in combination with the cross pin, I, and the convex center, E, as and for the purpose set forth.

Third, I claim the grate, B, working upon the center, E, so arranged as to dump on a line with the shank, J, at any point within the sphere of its movement, as and for the purpose set forth.

**60,335.—PROPELLING HORSE.—John H. Brown, New York City.**

I claim the combination and arrangement of the wheel, B, axle, c, horse, A, wheels, D, shaft, E, and levers, F F, as herein set forth, operating in the manner and for the purpose specified.

**60,336.—SPRING TOY.—John H. Brown, New York City.**

First, I claim the lever, C, spring, D, and regulating drum, b, in combination with the toy, A, constructed and operating substantially as and for the purpose set forth.

Second, Graduating the lever, C, so that the leverage of the spring can be accommodated to the weight of the child occupying the toy.

Third, Supporting the toy on a fulcrum, a, at its back end, substantially as and for the purpose described.

**60,337.—MODE OF ATTACHING HANDLES TO BOILERS AND OTHER VESSELS.—John H. Brown, New York City.**

I claim the pear-shaped slots in the ears, a, in combination with the flattened ends of the bail or handle of the kettle, A, constructed and operating substantially as and for the purpose described.

**60,338.—FEEDING DEVICE FOR CARDING ENGINES.—George Bruce, Corydon, Ind.**

First, I claim the pitman, G, pawl, L, ratchet wheel, M, toothed wheels, O P, and pinions, Q and R, in combination with the aprons, B and B', for the purposes and substantially as herein described.

Third, I claim the manner of accelerating or reducing the feed by lengthening or shortening the stroke of the pawl, L, by means of the lever, G, and cord, J, substantially as herein set forth.

**60,339.—COMBINED TABLE AND BEDSTEAD.—Sanford S. Burr, Dedham, Mass.**

I claim the combination of the table top, I, and its connections, with the slat frame, H, and box, A B C D E F and G, for the purpose and operating substantially as above described.

I also claim a combination of the sides of the table, L M and b, with the top, I, and the leaf, N, so constructed and arranged by means of the pin sliding in the groove, E, that the same can at will be transformed into the bottom end and support of the bed, in the manner and for the purposes substantially as herein described.

I also claim the combination of a table with a bedstead, in one piece of furnitute, adjustable at the will of the operator by means of the pin sliding in the groove, E, constructed and operating substantially as herein described.

**60,340.—MODE OF FASTENING AND UNFASTENING DROP DOORS IN COAL CARS.—William Burt, Marquette, Mich.**

I claim the combination of the lever, B, shaft, L, cams, C, attached to the said shafts, L, pins, P, with drop doors, a, when the same are constructed and arranged in the manner and for the purpose set forth.

**60,341.—ROTARY CUTTING MACHINE.—James J. Butler, Cincinnati, Ohio.**

I claim, First, The rotary knife or cutter, M, and arm, L, in combination with the mandrels, C and G, for the purposes and substantially as described.

Second, I claim the bevel gearing attached to a crank for driving the mandrels, to which the cutter or knife is attached, substantially and for the purpose set forth.

Third, I claim the upright screw, D, in connection with the mandrel pressing on the disk, I, or material, substantially as herein shown and described.

**60,342.—TAP BORER.—Silas S. Crocker (assignor to himself and D. R. Crocker), Maquoketa, Iowa.**

I claim the volute shaped tool with a sharpened, salient, spiral edge, with the gimlet point, substantially as described.

**60,343.—TOOL FOR SETTING JEWELS IN WATCHES.—A. C. Crosby, Union, Pa.**

I claim the securing or setting jewels in watch plates by means of a die or tool constructed in the manner substantially as shown and described.

**60,344.—MEASURING LIQUIDS.—George W. Devoe, New York, city.**

I claim, First, The suspension and arrangement of the weighted funnels, M, in relation with the series of measuring vessels, E, and with the cans, C, as they are pushed under the said funnels, substantially as herein set forth for the purpose specified.

Second, A measuring apparatus consisting of one or more measuring vessels, E, arranged in relation with a reservoir, B, and furnished with inlet and outlet valves or stop cocks, FK, and with a suspended funnel or funnels, M, and a whistle or whistles, e, substantially as herein set forth.

**60,345.—FEATHERING PADDLE WHEEL.—John V. Dinsmore (assignor to himself and M. Harris), Milford, Mass.**

I claim the combination for operating each of the paddles while the wheel is revolving, the same consisting of the cam, G, the sliding and rotary shaft, F, its bearing, b, stud, g, notch f, shoulders, d e, arm, m, cams, n and g, and the arm, p, and the roller, o, or the equivalent thereof, the paddle being applied eccentrically upon the shaft, and the whole being in other respects substantially as hereinbefore described.

I also claim the cam, G, as made in two parts hinged together, and applied to the side of the vessel, so that one of them may be stationary thereon, and the other movable, as and to produce with the wheel, results as above set forth.

**60,346.—GRADING INSTRUMENT.—Samuel L. Donnell, Spring Creek, Tenn.**

I claim the bubble block, D, mounted upon a collar, G, swiveled upon the stand, A, or its equivalent, in combination with the balance ball or weight, H, suspended from the said block, and about and around the stand, A, substantially as herein described and for the purpose specified.

Second, In combination with the above, arranging either one or both of the legs, J J2, in the bubble block, D, from which the balance ball, H, is suspended in such a manner as to be susceptible of being adjusted therein, substantially as and for the purpose described.

Third, The combination with the sights of the bubble block of the thumb or set screws, R, and fixed pointer, U, arranged substantially as described and for the purpose set forth.

Fourth, The use of a transverse swiveled block, V, for the purpose described.

**60,347.—POTATO DIGGER.—M. T. Drake, Pleasant Ridge, Ohio.**

I claim, First, The main frame, A, vibrating inner frame, A', gaging frame, A'', and axle, B, constructed substantially as above described and for the purpose specified.

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second. The levelers, m, constructed and operating as above described and for the purpose set forth.

Third, The levelers, m, and cutters, k, in combination with gaging frame, A", substantially as above described and set forth.

Fourth, The plow, F, consisting of shovel, q, share, r, and mold boards, s, as above described when used for the purpose set forth.

Fifth, The shovel, q, in combination with the vibrating inner frame, A, constructed and operating as above described and for the purpose set forth.

Sixth, The endless bucket elevator, D, constructed substantially as above described.

Seventh, The pulverizing board, 8, in combination with the endless bucket elevator, D, for the purpose specified.

Eighth, The irregularly reciprocating screen, 1, in combination with the crank shaft, 5, constructed and operating as above described and for the purpose set forth.

Ninth, The dumping box, 9, in combination with rod, 10, and lever, 11, constructed and operating substantially as above described and for the purpose set forth.

Tenth, The clutch gearing, f and x, in combination with the levers, y and y', and eccentric, z, as above described and for the purposes set forth.

Eleventh, The frames, A A' and A", levelers, m, circular cutters, K, plow, F, endless bucket elevator, D, pulverizing board, 8, irregularly reciprocating screen, 1, dumping box, 9, and clutch gearings, f and x, combined and operating as above described, and for the purpose set forth.

### 60,348.—Sled Brake.—R. B. Dutton (assignor to himself and N. C. White), Iron Hill, Iowa.

I claim the combination and arrangement of the jointed dog, G, clash, H, lever, F, f l drum rod, E, ratchet bar, I, and spring, K', with each other, and with the rave, D, and runner, A, of the sled, the whole being constructed and operated substantially as herein described, and for the purpose set forth.

### 60,349.—Coal Scuttle.—Edgar Eltinge, Kingston, New York.

I claim the shield, D, when constructed, as described and applied as and for the purpose specified.

### 60,350.—Blower.—John A. Evarts, Meriden, Ct.

I claim the combination of the outer cylinder, A, the inner cylinder, C, and the plate, F, when the said plate, F, is connected by a strap or straps, G, to and so as to be operated by the inner cylinder, and the whole constructed and arranged substantially in the manner and for the purpose specified.

### 60,351.—Bed Clothes Clamp.—William Fisher, Ripon, Wis.

I claim the combination with the spring lever arms, E, hinged and jointed together in pairs, of the jaw rails or bars, C, connecting the several pairs of said levers, substantially as described for the purpose specified.

### 60,352.—Vacuum Ventilator.—J. W. Foard, San Francisco, Cal.

I claim the apparatus above described for raising fluids, gaseous or liquid, by means of natural or artificial currents of air composed of horizontal tubes or pipes, a c, which are supported by means of the collar, b, upon the vertical pipe, e, so as to be free to revolve thereon, and which are guided and maintained in proper position by means of supplementary pipe, d, that extends from pipe, a, into said vertical pipe, e, substantially as above shown.

### 60,353.—Needle Threader for Sewing Machines.—M. B. Foote, Northampton, Mass.

I claim the frame, A, with its handle, B, springs, D, and the arms, C, to the lower one of which the slotted eye, E, is secured in combination with the slotted right-angular gage, G, all operating substantially as described for the purpose specified.

### 60,354.—Circular Sawing Machine.—Lewis Fossee, Jeffersonville, Ind.

First, I claim the adjustable slotted frame, G, and set screw, f, for canting the saw, arranged and operating substantially for the purpose specified.

Second, Sheeing the plank by means of the segment racks, F F, wheels, G G', radiating shafts, m m', guide rod, H, and dogs, I I', substantially as described for the purpose specified.

### 60,355.—Potato Masher.—Vincent Fountain, Jr., Castleton, N. Y.

I claim as a new article of manufacture, a potato masher constructed as described to wit: the cylinder or tubular receptacle, A, provided with the detachable perforated bottom, B, and handles, one in each side, and the plunger, C, all as shown and set forth.

### 60,356.—School and Family Slate.—John H. French, Geddes, N. Y.

First, I claim the frame, A, made with two compartments, one of which contains a slate, while the other is so constructed as to admit of the insertion of any convenient number of cards of pasteboard or other material containing lessons or copies for writing, printing, marking or drawing, and exercises in arithmetic either any or all combined, substantially as and for the purpose described.

Second, The arrangement in one or both surfaces of a slate of permanent perpendicular and slope lines, in combination with the ordinary horizontal lines, substantially as and for the purpose set forth.

### 60,357.—Crib for Children.—William L. Gerard, Fort Wayne, Ind.

I claim the panels, A, in combination with the elastic hinges, B, and the mat, C, the whole being arranged and constructed in the manner and for the purpose described and set forth.

### 60,358.—Fence.—Thomas Glover, Woodbury, N. J.

First, I claim the post, A, and plate, a, in combination with the braces, b b, and detachable blot, d, or its equivalent, the whole being constructed and arranged substantially as and for the purpose described.

Second, The post, A, and plate, a, with its slots, x x, in combination with the detachable braces, b b, enlarged at the lower ends for the purposes set forth.

Third, The shoulder, e, on the post, A, for the purpose specified.

### 60,359.—Machine for Pulling Hemp and Cotton Stalks.—Artemus W. Goddard, Clinton, Mass.

First, I claim the sectional flexible wheels, d d, of the form substantially as herein described, or their equivalent, arranged together and operated as described.

Second, The spur belts, e e, for carrying the tops of the stalks to the rear, or their equivalent, substantially as described.

Third, The rollers, i i i, and frames, f f, for keeping the sectional flexible wheels together, arranged as and for the purpose specified.

Fourth, The combination of the whole consisting of the sectional flexible wheels, d d, the spur belts, e e, the rollers, i i i, and the frames, f f, arranged together as and for the purpose specified.

### 60,360.—Sewing-machine Guide.—H. C. Goodrich, Chicago, Ill.

First, I claim the rigid plate, B, having its under surface corrugated, as shown when hinged to the guide plate, A, as herein set forth, so that it can be folded over back on the plate, A, when not in use.

Second, I claim the plate, B, hinged as shown to the plate, A, and having its inner end made heavier than its outer end, substantially as and for the purpose set forth.

### 60,361.—Grappling Tool.—N. W. Green, Cortland Village, N. Y.

First, I claim the self-adjusting grapple, B B, the adjustable fulcra, c c, in combination of the levers, D D,

Second, I claim the frame, F F F, including the standard, A A, in combination with the grapple, B B, the adjustable fulcra, c c, and the lever, D D, for the purpose described.

### 60,362.—Portable Wash Stand.—Samuel B. Guernsey (assignor to himself and Richard S. Pain), Chicago, Ill. Antedated Nov. 26, 1866.

I claim, in combination with a portable wash stand, a water reservoir permanently attached thereto, having two compartments, C D, and a recess, E, beneath one of them, substantially as and for the purposes specified.

Second, I claim, as arranged with the foregoing, the wash basin, H, pipes, I J, cover, K, and can, L, as and for the purposes specified.

### 60,363.—Churn Dasher.—A. W. Hall, New York City.

I claim an atmospheric churn dasher constructed with a series of inverted funnels or hollow cones arranged one above the other and attached firmly and air-tight to the stem of the common dasher, in combination with the plate, B, at bottom of the stem, substantially as shown and described.

### 60,364.—Dish Mop.—Aaron S. Hadley, Boston, Mass.

I claim the combination and arrangement of the auxiliary or internal mass of the fibrous material, C, projecting from the end of the socketed handle, A, with such handle and either or both the masses, D E, of fibrous material extended from the periphery of the head of such handle, as set forth.

### 60,365.—Rotary Pump and Engine.—Dexter D. Hardy (assignor to Thomas H. Foulds), Cincinnati, Ohio.

I claim the rotary pistons, B B', whose peripheries are formed by quarter circles, a a' and b b', of different diameters, connected by suitable sides, c, in the described combination with the two central inner tongues, D D', of the case, A, as and for the purpose specified.

### 60,366.—Rotary Pump and Engine.—D. D. Hardy and J. J. Morris, Cincinnati, Ohio.

We claim, First, constructing the rotary pistons, B B', of arcs of circles, a a' b b', of different diameters, connected by epicycloid faces, c', in the described combination with the elastic gibs, G', as and for the purpose specified.

Second, We claim, as arranged with the above combination, the set screws, J, for preventing lateral play of the shafts and pistons, as set forth.

### 60,367.—Tool for Inserting Screw Eyes.—Benjamin T. Harris, Brooklyn, N. Y.

I claim the device for inserting screw eyes in picture frames, etc., consisting of the eye holder, e, formed substantially as specified, and rotated by the mechanism herein described, substantially as set forth.

### 60,368.—Bed Bottom.—W. J. Haswell, Waverly, N. Y.

I claim the springs, d, passing down through mortises in the sides and ends of the bedstead or frame, A, in combination with movable rods, e, straps, c, and the flexible bottom, B, all constructed and operating substantially in the manner and for the purpose set forth.

### 60,369.—Packing Revolving Joints.—Jonathan Hatch (assignor to himself, C. Smith, and H. Winchester), South Windham, Conn.

I claim the combination with the stuffing box, b, and gland, C, of the pipe, B, formed with a collar, e, and provided with packing, f f', on each side or face of said collar, substantially as and for the purpose or purposes herein set forth.

### 60,370.—Condensed Extract of Malt.—Thomas Hawks, Rochester, N. Y.

I claim condensing the extract or infusion of malt by evaporation in vacuo, for the manufacture of ale, beer, and other liquors, substantially as set forth.

I also claim, as a new product, the extract of malt when condensed to a solid or nearly solid substance, substantially in the manner and for the purposes herein set forth.

I also claim, as a new product, the extract of malt, either with or without the addition of hops when condensed in vacuo, substantially in the manner and for the purposes set forth.

### 60,371.—Sawhorse or Buck.—Henry M. Hayward, Boston, Mass.

I claim the improved sawhorse, as constructed with stop joints, as described.

I also claim the application or arrangement of the roller with a sawhorse so as to operate or turn on its middle connecting rod or bar, in manner and for the purpose as hereinbefore set forth.

### 60,372.—Stump Extractor.—Nathan M. Healy, Flushing, Mich.

I claim the hold-fast bars, E', slotted blocks, C', levers, F, and chains, G, in combination with the notched bar, E, cap piece, C, uprights, D, inclined supports, B, and runners, A, arranged and operating substantially as herein shown and described.

### 60,373.—Water Wheel.—Samuel Hicks, Orangeville, Ind.

I claim the wheel having an inverted conical head, D, with buckets, E, attached, curved at the lower ends, and secured to a ring or annular bar, F, substantially as described for the purposes specified.

### 60,374.—Sawmill.—James A. Holford, Guionsville, Ind.

First, I claim the automatic log-setting device consisting of the head blocks, I and K, pinions, o and p, shaft, L, ratchet wheel, r, pawls, r', lever, r", adjustable rest, t, and incline, S, all constructed substantially as and for the purpose herein shown and described.

Second, I claim the automatic feeding device, consisting of the carriage, H, reversing lever, h4, spring, m, and stop levers, h2 and h3, constructed substantially in the manner and for the purpose herein shown and described.

### 60,375.—Corn Sheller.—Michael and Simeon Housman, Huntington, Ind.

We claim the pin passing through the jaws or blades, and the coiled spring around the same, constructed and arranged as hereinbefore described and substantially set forth.

### 60,376.—Baling Press.—Guy D. Howe, Lewisport, Ky.

I claim the movable boxes, C, when used in combination with a suitable press, constructed and operating in the manner and for the purpose herein specified.

### 60,377.—Street Lantern.—A. R. and E. A. Hunt, Newark, N. J.

We claim a street lantern having its various side frames, H, and top frames, P, made of cast iron, and constructed and joined together, substantially in the manner and for the purpose described.

### 60,378.—Steam Valve.—G. G. Hunt, Bridgeport, Conn.

I claim the arm, G, applied to the valve rod, F, and secured thereto by means of a set screw, g, in connection with the slotted plate, h, attached to the stuffing box, f, substantially as and for the purpose specified.

### 60,379.—Steam Pipe.—G. A. Jasper, Charlestown, Mass.

I claim the register as a device to be used in combination with a steam apparatus, for the purpose of more efficiently controlling and utilizing the steam, substantially as described.

### 60,380.—Tool for Cutting Tubes.—John V. Jepson, Brooklyn, N. Y.

I claim the combination of the stationary knife, D, with the adjustable knife, F, and the jaw, A, of the wrench, constructed and arranged substantially as described.

### 60,381.—Fire-proof Felt for Roofing and Other Purposes.—Moses A. Johnson, Lowell, Mass.

I claim a felted fabric of hair or other material, covered on one or both of its sides with paper, and with silicate of soda or soluble glass, and whether painted or otherwise rendered water-proof or not, as herein described.

### 60,382.—Drying Artists' Materials.—Gilbert D. Jones, New York City.

I claim the rotating heated drum or cylinder, A, having its periphery partially inclosed by a jacket, C, forming a hot-air passage, a, in connection with a spreading knife or trowel, G, and a scraper or discharging knife, H, all arranged to operate in the manner substantially as and for the purpose set forth.

I further claim the roller, F, when used in connection with the heated drum or cylinder, A, and trowel, G, to operate substantially as and for the purpose herein set forth.

### 60,383.—Basket.—Horace C. Jones, Dowagiac, Mich.

First, I claim the combination of the inside hoop or band, g with the outside hoop or band, g', in the construction of the stave basket, substantially in the manner described.

Second, The manner, herein shown and described, of securing handles, G G, to the basket.

### 60,384.—Car Coupling.—Elias H. Keith, Peoria, Ill.

First, I claim the swinging loop, B, with projections, g, and limited by stops, i and k, as described, and for the purpose set forth.

Second, The combination of the hook, C, crank, D, and rod, d, and reversing bar, a, in mortise, m, or their equivalents, as and for the purpose set forth.

### 60,385.—Hominy Mill.—Bernard Kemp, Knoxville, Md.

I claim the arrangement of the frame, A, with its case, D, screens, H, hoors, I, board, J, fan, C, arms, E E, and teeth, G, in the manner substantially as and for the purposes herein specified.

### 60,386.—Wool-oiling Apparatus for Carding Engines.—P. C. Kirk and M. Pendergast, Lawrence, Mass.

First, We claim operating the supply cocks of a wool-oiling apparatus by the traveling motion of the reservoir, substantially as set forth.

Second, We also claim operating the cocks, i k, by t e pinions, l m, and rack, I, substantially in the manner and for the purpose described.

Third, We also claim the pipe, K, with its cock. n. for admitting air into the passage between the cocks, j k, substantially as set forth.

Fourth, We also claim the agitator or mixer, o, when operated by contact with the pin, p, projecting from the railing, L, for the purpose set fort .

### 60,387.—Machine for Opening and Cleaning Cotton.—Richard Kitson, Lowell, Mass.

First, I claim the fender, D, arranged beneath the seed rack, substantially in the manner and for the purpose set forth.

Second, Forming the communication between the seed chamber, C, and throat, E, so as to allow the air to pass from the seed chambers to the dust trunks, K, giving vent to the seed chamber, C, and preventing the seed being sucked back again with the cotton, substantially as set forth.

### 60,388.—Narrow-ware Looms.—L. J. Knowles, Warren, Mass.

I claim the combination of the slot, v, or its equivalent, with the mechanism, substantially for operating the lay rack as set forth, such mechanism consisting not only of the link, l, the straps, e e, and their guide wheels as applied to the lay and its rack, substantially as described, but of the crank, n, the shaft, o, and the bevel gears, t u, or their mechanical equivalent or equivalents, operated by the cranked shaft of the lay.

I also claim the above-described mode of making each of the series of take-up rollers, viz: of two heads a series of annular and cross bars or connectors, as set forth.

I also claim the application of each of the top or pressure rollers to the loom, viz: by means of an inclined hanger, to operate substantially as described.

I also claim the application of one series of take-up rollers to the other series thereof, substantially in the manner as described, that is, by means of the head, c', the journal, a', socket, d', and stud, f', arranged and applied to the two series as set forth.

### 60,389.—Baby Chair and Table.—John Kopp, Bridgeport, Conn.

I claim the combination of the reversible chair with the table, whereby the chair may be used either as a high or a low chair, substantially as herein described.

### 60,390.—Fire Shield.—Joel Lee, Galesburg, Ill.

I claim the arrangement of the pulleys, C C, supports and guides, B B, chains, G G, and stay braces, D D, with the metallic plates, A, substantially in the manner and for the purpose specified.

### 60,391.—Churn.—George H. Lenher, Richmond, Va. Antedated Nov. 30, 1866.

First, I claim the arrangement of the hollow spindle, L, perforated rotating tube, M, and vertical fixed counter dashers, o o, constructed and operating in the manner and for the purpose herein specified.

Second, I also claim fastening on the covers of churns by means of hooks on opposite sides of their bodies, and of revolving cams on the edges of the covers, substantially as described.

### 60,392.—Harvester Rake.—Samuel K. Lighter, Hamilton, Ohio. Antedated October 28, 1866.

I claim the arrangement of rake, E, universal joint or fulcrum, F, limber heel, G, fixed cam, H, pitman, J, and guide, K k, the whole being constructed, combined and adapted to operate in the manner set forth.

### 60,393.—Braces for Wagon Springs.—James H. Lockie, Humphrey, N. Y.

I claim the combination of the short levers, C, the connecting rods, D and F, and the T braces, E and G, with each other and with the reach, A, and box frame, S, of the wagon, substantially as herein shown and described and for the purpose set forth.

### 60,394.—Mode of Disinfecting Noxious Vapors from Rendering Houses, Hospitals, etc.—Radcliffe B. Lockwood (assignor to Lockwood & Everett), New York City.

I claim controlling, disinfecting and deodorizing the noxious gases or vapors generated in rendering houses, slaughter houses, hospitals or sewers, by forcing or drawing said gas or vapors from said building, houses, or sewers through a superheating or other furnace, or through a chamber, charged with a disinfecting and deodorizing material, by which said gases or vapors are disorganized and rendered innoxious and inodorous, or are consumed.

### 60,395.—Piston Packing.—Barker Lowe, Fall River, Mass.

I claim the rings, a b, incasing the head and follower, and provided with the flanges, a' b', in combination with the beveled spiral spring, c, constructed as described, substantially as and for the purpose specified.

### 60,396.—Process of Distilling Petroleum Oils and Other Substances.—Orazio Lugo and T. O. L. Schrader, New York City.

First, We claim the admission of air or gas into the still at a temperature equal to or greater than that of the oil or substance undergoing the distilling process, substantially as herein described.

Second, The heating of the air or gas previous to its admission into the still, by the same means or medium employed for the heating of the still itself, and in such manner that the temperatures of the substance undergoing distillation and that of the air or gas admitted to the still will increase or decrease in or nearly in the same ratio, substantially as herein described.

Third, The utilization of the waste heat from the still by its employment to effect a preparatory heating of the air or gas which is to be admitted into the still, substantially as herein set forth.

Fourth, Causing the air or gas while in the heated state, but before its admission into the still, to pass through or in contact with an oil of suitable character, substantially as herein specified.

### 60,397.—Peat Machine.—James B. Lyons, Cornwall, Conn.

I claim the construction of the molds, c c, they having racks

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b b, on both sides for the action of the pinions, a a, to convey them into and through the receiving box, D, as arranged, and operating substantially in the manner and for the purposes herein set forth.

60,398.—Apparatus for Grinding Peat.—James B. Lyons, Cornwall, Conn.

I claim the perforated end cylinder, H, in combination with the wiping wings, I I I, cutting and grinding mechanism, F F h h, operating to discharge the pulverized mass, substantially as and for the purposes herein set forth.

60,399.—Making Butter from Cheese Whey.—Homer C. Markham (assignor to himself and Charles G. Riggs), West Turin, N. Y.

I claim the separation of cream or butter from wheys by the means of heat and in the use of an acid liquid, substantially as herein described.

60,400.—Folding Lounge.—James W. McDonough, Chicago, Ill.

I claim the rails, A A, of the frame of the folding lounge, constructed and operating substantially in the manner herein described and specified, and the folding head, H, of the lounge constructed and operating substantially as herein described and specified.

60,401.—Head Block for Saw Mills.—B. F. McKinley (assignor to himself and H. R. Mathias), Cincinnati, Ohio.

I claim the regulating of the movement of the slide, B, and knee, C, by means of the adjustable head, N, or its equivalent, on bar, L, substantially as and for the purpose specified.

I further claim so adjusting head, N, or its equivalent, on bar, L, as to bring the pivot centers of link, M, and the fulcrum of lever, K, all on line when starting in combination with a similar arrangement of levers or links on head block, A, the centers of which are brought in line in stopping, and the slide, I, pawls, H H, and rack bar, G, all arranged substantially as and for the purpose set forth.

60,402.—Cotton Gin.—F. M. McMeekin, Morrison's Mills, Florida.

I claim the combination of the roller, C, roller, D, with adjustable bearings, slotted plate, E, reciprocating rake, G, and teeth, F, as described, and brush, I, arranged and operating substantially as and for the purpose specified.

60,403.—Knuckle Joint.—J. H. Mears and C. W. Yale, Oshkosh, Wis.

I claim the pentagonal socket, Fig. 1, in combination with the head, Fig. 2, substantially as set forth.

60,404.—Grinding Mill.—John M. Miller, Hamilton, Ohio.

I claim the arrangement of the tube, G, blower case, H, and receiving box, K, in combination with the case, E, provided with regulating slide, b, operating substantially as and for the purpose described.

60,405.—Safe.—L. H. Miller, Baltimore, Md.

First, A burglar proof wall for safe and other similar purposes, of wrought and cast metal, made and held together by secret studs, a a, all constructed substantially as described.

Second, The studs a a, projecting from the inner surface of one of the wrought metal plates, but not extending to the inner surface of a contiguous plate, in combination with a cast metal filling between said plates, substantially as described.

60,406.—Tags.—Charles A. Moore, West Brook, Conn.

I claim the interposing or placing between metallic fastenings, the thread, tape, or twine, substantially as specified and for the purpose herein set forth.

60,407.—Tatting Shuttle Winder.—James D. Moore, Grinnell, Iowa.

I claim the frame, A, formed of a single piece of metal, and bent into form substantially as described, in combination with the wheel, G, and H, and spool, B, supported in said frame as set forth.

I also claim in combination with said frame the spring, I, which holds the shuttle in its place, and opens the jaws of the shuttle to receive the thread freely, substantially as specified.

60,408.—Water Wheel.—Henry G. Nelson, Lockport, N. Y.

First, I claim making the arms of the bridge tree grooved for the purpose of conducting water into the step for lubrication, substantially as described.

Second, The adjustable hub, E, in combination with the hub, D, for the purpose and substantially as described.

Third, A water-wheel bucket having the parts, f1 f2 f3 and f4, in combination substantially as set forth.

Fourth, The stationary scrolls, J, and horizontally-moving gates, L, when arranged with a segment ring, N, operating gear and arms, Q, and friction rollers, S, as a means of opening and closing the gates, L, substantially as described.

60,409.—Oil Can.—William C. Newkirk, Piqua, Ohio.

I claim an oil can with a projecting rim around the outside, either at the bottom or above it, forming a channel, substantially as described for the purpose herein set forth.

I claim the extra spout, B, in combination with the said channel, substantially as described.

60,410.—Washing Machine.—L. L. Newman, Jackson, Mich., assignor to himself and A. C. Zearing, Dayton, Ohio.

I claim the combination of the parts, C C and F, with their several rollers, pieces, D, the shaft and box, A, when arranged and operated substantially as described.

60,411.—Pin for Attaching Wearing Apparel.—R. J. Nunn, Savannah, Ga.

I claim a pin consisting of a shank, a disk, ball, oval, or other head, an enlarged portion and a retaining shoulder, substantially as described.

60,412.—Damper or Draft Regulator for Stoves.—Solomon Oppenheimer, Peru, Ind.

I claim the cup, A, constructed as shown, and provided with the discharge cap, E, or its equivalent.

I also claim, in combination with the above, the arm, C, and the handle, D, and the connecting rod.

60,413.—Dumping Wagon.—J. L. Ordner, Cleveland, Ohio.

I claim the rollers, c, and frame, F, when constructed and arranged in relation to each other as set forth, in combination with the described box, A, provided with fastenings, n, the whole supported upon the bolsters, G, when used conjointly in the manner and for the purpose set forth.

60,414.—Churn.—V. Palmer, Castalia, Ohio.

I claim the perforated dasher, I, the adjustable wings, I', and checks, d, as arranged in combination with the links, H and G, and the handle, F, in the manner and for the purpose set forth.

60,415.—Farm Gate.—Enos H. Peck, Brownhelm, Ohio.

I claim the cap, d, inclined plaue, h i, and balls, j k, in combination with the center post, B, brace, C, and counter balance gate, as and for the purpose set forth.

60,416.—Lamp.—John M. Perkins and Mark W. House, Cleveland, Ohio.

First, We claim the combination of the annular reservoir, A, the annular air chamber, D, the burning chamber, B, the supply pipes, P, and vent tubes, V, constructed and arranged substantially as and for the purposes described.

Second, We also claim the collar, C, in combination with the perforated burner, G, when both are so constructed and arranged as to extend the cold air chamber, D, up around the perforated portion of the burner, substantially as shown and described.

60,417.—Apparatus for Charging Air with Gasolin.—Barton Pickering, Milton, Ohio.

First, I claim the tube, O2, to supply mixed air or gas to the vessel, C, from the vessel, D, connected substantially as described, for the purpose set forth.

Second, I claim the supply tube, O3, connecting the vessels, C and D, substantially as described and for the purpose set forth.

Third, I claim arranging the supply vessel, C, within the vessel, A, substantially as described.

Fourth, I claim the construction of the generating vessel, D, with the partitions, i i i, bagging or other suitable material on these surfaces, the orifices, k k k, giving an alternating direction to each, the air and gasolin, as described and for the purposes set forth.

Fifth, I claim the vessels, A and A1, vessels, B and B1, the vessel C, the vessel, D, the tubes, c f g h n, the stop cocks o1 o2 o3 o4, the whole being constructed and combined substantially for the purposes set forth.

60,418.—Sewing Machine.—Francis A. Pratt, Hartfort, Conn.

I claim the employment of the gib or shoe, d, and cross head, a, with the way, c, substantially as and for the purpose described.

60,419.—Stove Boiler.—Miles Pratt, Boston, Mass.

I claim the improved boiler as made, with the flue arranged against its sides r rear.

60,420.—Welding of Iron and Steel.—John P. Price (assignor to Frank K. Hipple), Philadelphia, Pa.

I claim the welding of iron or steel by the aid of kryolite, as set forth.

60,421.—Dice Box.—Edmund W. Quincy, Lacon, Ill.

I claim the arrangement of the disk, D, and its connection with the flat spring, E, by means of the piston or rod, C, and the open bottom which enables an easy renewal of the spring when necessary, all as and for the purposes set forth.

60,422.—Cultivator.—Barbery S. Rich, Pennfield, N. Y., Administratrix of the Estate of J. C. Rich, deceased.

First, I claim the standard frame, C, provided with the lugs, l', at the top, and the parts, h h l n, at the bottom, when combined with expanding arms, E E, of a flexible metallic cultivator, the whole operating substantially as and for the purpose specified.

Second, The gage wheel stirrups, composed of two counterparts, r r, and provided with the projections, t t, when combined with the flat side, a, of the cultivator frame, as herein set forth.

60,423.—Hydrant.—J. P. Riley, Philadelphia, Pa.

First, I claim the hollow plug, H, and shank, h, in combination with the box, G, substantially as described for the purpose specified.

Second, The combination and arrangement of the stock, D, base, B, cap, C, section, A, key, K, and its shield, plug, H, as described, and box, G, substantially as described, as and for the purpose specified.

60,424.—Bottle Stopper.—Daniel T. Robinson (assignor to himself and Nathaniel Jenkins), Boston, Mass.

I claim the improved bottle stopper fastening as composed of the slotted stopper or plug, B, the cammed lever, C, or its equivalent, and the wire, c, the whole being arranged and combined together in manner and to operate as specified.

And in combination with the above described arrangements of parts, I claim the rubber masher or covering, h, essentially in manner and for the purpose as described.

60,425.—Mode of Constructing Buildings.—Frederick O. Rogers, Niles, Mich.

I claim constructing the walls and roofs of wooden buildings, whole or in sections, by the union of two or more series, or layers, of laths or battens, crossing each other transversely, the said walls and roofs, or sections thereof, being united so as to form a firm structure without the use of additional walls, frame work, or braces, substantially as and for the purpose herein specified.

60,426.—Curtain Fixture.—Levi Ross (assignor to himself and Oliver K. Phillips), Springfield, Mass. Antedated Nov. 24, 1866.

I claim the mode of hanging window curtains herein described by means of the two rolls, A B, connected with the curtain by the tapes, E E F F, when combined with the two cords, G H, and their respective rollers or pulleys, c d, arranged and operated substantially as herein set forth.

60,427.—Harvester.—Nathaniel Rowe, Emmittsburg, Md. Antedated Dec. 4, 1866.

First, I claim arranging the entire gearing at the center of the machine and surrounding it with a casing, E, the gearing and casing being constructed and arranged substantially as set forth.

Second, I claim the detachable piece, P, in combination with the shaft, N, and casing, E, when the latter is constructed with a movable cap that covers the gearing on the axle and the pieces, P, substantially as and for the purpose set forth.

Third, I claim attaching the braces of the tongue, T, by a collar to a flange, E2, projecting from and being a part of the casing, E, substantially in the manner set forth.

Fourth, I claim the combination of the driver's seat, V, and springs, V2, with the standards, U, when the same are permanently attached to and on the opposite side of the axle from the braces of the tongue.

Fifth, I claim the slotted and bifurcated lever, S, when connected with the cutter-bar in front and rear, substantially as and for the purpose set forth.

60,428.—Corset.—C. D. Rutherford, Brooklyn, N. Y.

I claim a corset made of a skeleton or open form, in combination with the net work, F F, the whole being constructed substantially as herein described and for the purpose specified.

60,429.—Oil Can.—Stephen Sargent, Lowell, Mass.

I claim the combination of the venting chamber, A, venting tube, C, passage, c or g, or their equivalent, with the oil can, the whole arranged substantially as and for the purpose set forth.

60,430.—Machine For Cutting Bungs for Barrels.—John George Schmidt, Rochester, N. Y.

I claim adjusting the cutters of a bung cutter by means of the screws, g, springs, ', and pins, K, so as to enable it to cut bungs of different sizes and taper, substantially as described.

60,431.—Skate.—George Scott and John W. Smith (assignors to themselves and James Smith), Boston, Mass.

We claim, as our invention, the arrangement as well as the combination of the rocker, B, and the two runners, C C, and the foot rest, A.

We also claim the combination of the foot rest with the inclined toe beak, a, arranged on it, and to operate with the beak, c, when applied thereto, substantially as set forth.

We also claim the mode of applying the heel screw to the skate, viz., by extending it up through the foot rest, and supporting its head in a bearing to extend into the nick of the screw, as described.

60,432.—Magnet for Telegraphs.—Tal. P. Shaffner, Louisville, Ky. Antedated Nov. 25, 1866.

I claim making an electro magnet of the armature by means of a current induced by the main circuit, substantially as herein set forth, in connection with the electro magnet, A A, or its equivalent, for telegraphic purposes.

60,433.—Sewing Machine.—Isaac Merritt Singer, Yonkers, N. Y.

First, I claim the combination in a sewing machine of the following instrumentalities, viz.: the reciprocating needle carrier and an oscillating shuttle, having its delivery eye coincident with its center of oscillation, substantially as set forth.

Second, The shuttle oscillating substantially as described, having a delivery eye arranged at one side of the plane of oscillation of the shuttle point, substantially as set forth.

Third, The combination in a sewing machine of the following instrumentalities, viz.: the shuttle, spring holder, and stop for the spring holder, substantially as set forth.

Fourth, The combination in a sewing machine of the following instrumentalities, viz.: the block for holding the shuttle in place at one side, and a shuttle guide for holding the shuttle at its other side, so arranged that it guides the shuttle only when its point is in the vicinity of the needle, leaving it free at other times, substantially as set forth.

Fifth, The combination in a sewing machine of the following instrumentalities, viz.: the oscillating shuttle drivers, reciprocating connecting rod, and spring acting crosswise to said rod, substantially as set forth.

Sixth, The combination in a sewing machine of the following instrumentalities, viz.: the needle holder, oscillating shuttle, take-up lever, cam, and spring, substantially as set forth.

Seventh, The combination and arrangement in a sewing machine of the following instrumentalities, viz.: the spool support, thread tension, and thread-slackening mechanism, substantially as set forth.

Eighth, The combination in a sewing machine of the following instrumentalities, viz.: the feeding instrument, bar reciprocating crosswise to the movement of said instrument, and turning, slotted, regulating plate, with its slot extended at opposite sides of the center on which it turns, substantially as set forth.

Ninth, The combination in a sewing machine of the following instrumentalities, viz.: the reversing and regulating lever that controls the feed, and two stops, substantially as set forth.

60,434.—Bridge.—Frederick H. Smith, Baltimore, Md.

I claim constructing a suspension truss in such a manner that all posts other than the center one, C, shall be supported by bars or braces, one of which, as D2, extends from the foot of the post, C', to be supported to an end of the straining beam, B, and the other bar or brace, D', supporting said post, C', being in a prolongation of the line of the bar or brace, D, supporting the center post, C, from the opposite end of the straining beam, substantially as described.

60,435.—Gate.—Stephen Spoor, Phelps, N. Y. Antedated Nov. 21, 1866.

I claim the combination with a vertically-revolving roller supporting the upper rail, of a roller support, C, having a horizontal joint and composed of guards, k k, recessed standards, l l, and bearings, h h, socket, b, and conical bearing pin, c, constructed and arranged substantially as shown and described.

60,436.—Breast Protector.—John Stadermann, New York City, and Henry Sauerbier, Newark, N. J.

We claim artificial breasts formed by swaging or striking up, out of one and the same piece of wire gauze or wire cloth, two protuberances of proper dimensions, and having the other portion of the wire gauze or cloth swaged or struck up to conform to the shape of the chest of the wearer, substantially as shown and described.

60,437.—Meter for Gas and Liquids.—Homer H. Stuart, Jamaica, N. Y.

I claim, as my invention, rotating the axle of a meter by vanes that are alternately extended and folded or retracted, substantially as described.

And I also claim by this invention to measure a fluid body by passing it transversely through a cylinder or other circular vessels containing vanes revolving in said cylinder or circular vessel, in such a manner that the said vanes, while moving in the direction of the flowing body, are radii of a circle as large as the inner surface of the cylinder, and while returning through the lower part of the cylinder to the point where the fluid is received they are folded or retracted so as to be the radii of a circle smaller than the periphery of the cylinder.

60,438.—Cheese Press.—William Thomas and William Rhoades, Mukwonago, Wis.

We claim the combination of the notched levers, I and K, with the pawls, T T, arms, V V, bed piece, M, and cross beam, B.

60,439.—Stamp for Marking Sheep.—Asahel Todd, Pultneyville, N. Y.

I claim as an improved article of manufacture, the metallic skeleton marking stamps, constructed as and for the purposes herein shown and described.

60,440.—Cupola Furnace.—Charles Truesdale (assignor to William Resor & Co.), Cincinnati, Ohio.

I claim the provision in a cupola or blast furnace of the several tiers of tweers in an ascending series with diminished issues, substantially as set forth.

60,441.—Elevator.—Otis Tufts, Boston, Mass.

I claim attachment of a suspending rope of an elevator car by means of an intermediate device, f, adjustable with reference to the car or drum, substantially as described.

Also, in combination with an elevator car, its winding drum, and two or more ropes or chains for hoisting or lowering the car, means for relative mechanical manipulatory adjustment of the length and tension of said ropes or chains, arranged to operate substantially as described.

Also, in combination with a winding drum of two rope bed curves reversed in position with respect to each other as set forth.

60,442.—Elevator.—Otis Tufts, Boston, Mass.

I claim, for the purpose of automatically adjusting the strain upon the ropes or chains, b b, the mechanism herein described, when arranged to operate substantially as specified.

60,443.—Elevator Guide.—Otis Tufts, Boston, Mass.

I claim combining the suspended car of an elevator with the ways or rails which confine it, by means of guides kept by springs constantly in contact with said ways or rails, when said guides are so arranged as to be capable of motion toward and from the rails.

Also, combining with the car and rails of an elevator, guide wheels provided with soft-surfaced peripheries, so as to operate as set forth.

Also, combining with the car and rails of an elevator, guide wheels having elastic peripheries, for the purpose specified.

Also, the rails or ways, a provided with ratchet teeth, b, re-enforced by flanges, c c.

60,444.—Means for Oiling Bodies Rotating around Shafts.—Otis Tufts, Boston, Mass.

I claim the construction, substantially as shown, of a loose pulley, clutch, or other similar device, or the hub thereof, with a removable head or heads, when the removable head or heads are provided with suitable packing, so as to form a closed cavity for containing lubricant directly around the parts to be lubricated.

Also the oil cups, h, when arranged within the cavity aforesaid, so as to operate as described.

60,445.—Continuous Percolator and Filtering Machine.—P. H. Vander Weyde, Philadelphia, Pa.

I claim, First, The above-described upward-acting percolators, into each of which the liquid enters below the solid material and overflows at the top into the next one.

Second, The placing of them on steps so that the liquid flows from the more exhausted solid material into that which is later added, coming in its course all the time in contact with fresher material.

Third, The manner described of displacing a series of any number of them on the incline rail track by turning the wheels, A and B, in order to remove only the vessel above containing exhausted solid material, and supplying one with fresh material at the lower end, without interrupting the operation, thus effecting a savin in material as well as of time.

60,446.—Cooking Stove.—Geo. W. Walker, Boston, Mass.

I claim the construction, substantially as shown and described by which the space above the ordinary high hearth or ash pit of

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the fire box of the common form of cooking stove is utilized for the purpose specified; said construction consisting of the extension of the top and sides of the stove over and to the front of said hearth or ash pit, when provided with doors which inclose the space and retain the heat therein while capable of being opened for the various purposes connected with the utilization of said space.

Also, in combination with such an inclosed space over the aforesaid hearth or ash pit, of the inclosure of the space below the same so as thereby to increase the capacity of the oven of the stove, substantially as described.

And I also claim in a cooking stove the arrangement of the oven with side and front doors and double walls or plates on either side and at the front of the oven between the front and side doors thereof, when the spaces inclosed between said double walls open into the lower flue so as to become charged with heated air and thus heating the oven as well as affording the strength needed in the structure of the stove.

60,447.—CORN PLANTER.—J. C. Walkinshaw (assignor to himself and Jos. W. McGonigle), Leavenworth, Kansas.

First, I claim the arrangement of the cams, b b, on the driving wheels, A A, in combination with the dropping bar, F, the vertical slides, k k, the seed compartments, a a, and the conductors, g g', constructed and operating substantially as and for the purposes herein described.

Second, The lever frame, l l, connected with the plows, h h, for raising and lowering them, constructed and arranged substantially as shown and described herein.

60,448.—TRAVELING-BAG FRAME.—Cornelius and Zachariah Walsh, Newark, N. J., assignors to Cornelius Walsh.

I claim the combination of jaws, A A', with the ends, a, as described, the bar, B, with tenons, c, secured in the jaw, A, all constructed and arranged in the manner and for the purpose herein specified.

60,449.—CULTIVATOR.—William T. Watson, Nottingham, Md.

First, I claim the teeth, C, of a cultivator, when constructed as set forth.

Second, The combination of the frame, A, teeth, C, and metallic sockets, D, when said several parts are respectively constructed and the whole arranged substantially as set forth.

60,450.—TYPE-DRESSING MACHINE.—Patrick Welch, New York City.

First, I claim setting up the types in lines standing upon their feet in the manner described to prepare them to be fed to the machine, substantially as herein set forth.

Second, The combination with a table or bed having a channel for the types formed upon it, substantially as described, of the knives, M M, and feed bar, D, as and for the purpose set forth.

Third, The combination with the knife beds, L L, forming a portion of a channel for the types of an adjustable support, W, substantially as herein set forth.

Fourth, The combination of the knives, N N, with the knives, M M, and feed bar, D, substantially as set forth.

Fifth, The combination of the movable guide, U, and the pusher, V, with the knife beds, L L, forming a channel for the types, and knives, M M, substantially as described.

Sixth, The combination of the feed bar, D, with the frame or pusher, j, the said pusher being operated substantially as described.

Seventh, The combination of the stop, u, with the feed bar, D, and pusher, t, substantially as herein set forth.

Eighth, The combination with the movable guide, U, and pusher, V, of the yielding guard, y, and adjustable guard, u', substantially as set forth.

Ninth, The combination with the puncher, V, and adjustable guard, u', of the stop or holder, t', substantially as herein described.

60,451.—LATHE CARRIER FOR DOG.—L. P. Wilcox, Brooklyn, N. Y.

I claim the saddle or supplementary block, B, constructed and fitted to the carrier, substantially as herein set forth for the purpose specified.

60,452.—LANTERN.—Samuel R. Wilmot, Bridgeport, Ct.

I claim the construction of the base of the lantern with an internal oil reservoir and with cavities, s, on opposite sides of the said reservoir for the reception and manipulation of the spring catches a, by which the base is attached to the body of the lantern, substantially as herein set forth for the purpose specified.

60,453.—STOVEPIPE ELBOW.—James Wilson, Wilmington, Del.

First, I claim an improved stovepipe elbow formed by combining the door frame and door, C D, the plates A and B, and the part, E, with each other, substantially as described and for the purpose set forth.

Second, The combination of the sliding damper, F, with the elbow, substantially as described and for the purpose set forth.

60,454.—PADLOCK.—John E. Wootten, Cresson, Pa.

First, The combination of the case, A, cylinder, B, and its arm, C, with the hasp, E, and the catch on the end of the same adapted to a catch on the end of the arm, C, the whole being arranged and operating substantially as and for the purpose herein set forth.

Second, The combination of the cylinder, B, circular tumblers and their projections, the hollow cylinder, h, and the cylinder, H with its wards, the whole being arranged and adapted to the casing, A, substantially as and for the purpose herein described.

60,455.—HYDROCARBON BURNER FOR HEATING PURPOSES.—James Youmans and John Reed, Davenport, Iowa.

We claim a gas generator constructed with a chamber, C, divided by a partition, D, into two compartments, E and F, and having also a pipe, I, burners, L, disk, m, and stem, N, said several parts being respectively constructed and arranged in relation one to another substantially as set forth.

60,456.—SELF-REGULATING TENSION FOR SEWING MACHINES, ETC.—Theodore Zinck (assignor to himself and F. W. Kalbfleisch), New York City.

I claim the arm, C, in combination with the friction spring, B, and bobbin, A, constructed and operating substantially as and for the purpose described.

## REISSUES.

2,414.—MACHINE FOR PULVERIZING CLAY.—George F. Blake and P. Hubbell (assignees of George F. Blake), Boston, Mass. Patented November 26, 1863.

First, We claim, in combination with a machine for cleaning and pulverizing clay or other plastic material, the reciprocating wipe or plunger, W, constructed and operating substantially as described.

Second, The revolving grate, constructed and operating as described.

Third, The stationary fingers, w, constructed, arranged and operating as set forth.

Fourth, The arrangement for conjoint operation of the inclined blades or sweeps, G, with the horizontal grate, G', in the manner described.

Fifth, We claim the arrangement for conjoint operation of reciprocating, oscillating, or rotating wipes, blades or sweeps, with rotating or stationary screens or gratings, substantially in the manner and for the purpose set forth.

2,415.—CARPET LINING.—George W. Chipman (assignee by mesne assignments of John R. Harrington), Boston, Mass. Patented April 1, 1856.

I claim, as a new article of manufacture, a carpet lining made up of a long or continuous sheet or sheets of stout paper, and a layer or layers of fibrous material applied thereto, substantially as set forth.

2,416.—MACHINE FOR MAKING CARPET LINING.—George W. Chipman (assignee by mesne assignments of John R. Harrington), Boston, Mass. Patented April 1, 1856.

I claim the process of making a carpet lining by progressively bringing into contact a sheet or sheets of stout paper, and a sheet or sheets of batting or soft fibrous material, so that upon contact of the contiguous surfaces they shall be caused to adhere together, substantially as described.

Also, in combining with a roll or rolls upon which the sheet or sheets of paper are wound, feed and presser rollers, operating to compress together and feed the paper and batting, substantially as set forth.

Also, in combination with the paper roll or rolls and feeding and compressing rolls, a paste or cement-applying mechanism, operating substantially as described.

Also, in combination with a wadding-forming apparatus, creasing or fold-forming rolls, operating as and for the purpose substantially as set forth.

Also, in combination with such fold-forming mechanism, the box or platform into which the wadding is delivered in folds, and from which it is removed for baling by letting down the fall, substantially as described.

2,417.—HOOP LOCK FOR COTTON BALES.—E. Victor Fassman, New Orleans, La. Patented April 18, 1865.

I claim the plate provided with slots, when the same is constructed with ridges or projections on both sides of the plate, substantially as set forth.

2,418.—TANNING.—Sanford A. Hickel, Roane County, W. Va., Calvin, James, and Benj. F. Armstrong, Jackson Court House, West Va., assignees of Sanford A. Hickel. Patented November 7, 1865.

We claim the employment or use of manure, in combination with bark or other tanning material, substantially as and for the purpose set forth.

## DESIGNS.

2,523.—PICTURE FRAME.—John H. Bellamy, Charlestown, Mass.

2,524.—BRACKET.—John H. Bellamy, Charlestown, Mass.

2,525 and 2,526.—CLOCK CASE.—William A. Giles, Chicago, Ill. Two Cases.

2,527.—TRADE MARK.—Daniel B. Kimball, New York City.

2,528.—SHAFTING HANGER.—C. C. Klein (assignor to Thomas Wood), Philadelphia, Pa.

2,529.—BUGGY.—John Reynolds, Washington, D. C.

## Inventions Patented in England by Americans.

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2,187.—BREECH-LOADING FIRE-ARM.—Thomas J. Vail, Hartford, Conn. Aug. 25, 1866.

2,470.—COMPOSITION AND PRODUCTION OF ARTIFICIAL STONE CEMENT, ETC.—George E. Vanderburg, New York City. Sept. 25, 1866.

2,517.—APPARATUS FOR FITTING GARMENTS.—Silas O. Brigham, San Francisco, Cal. Sept. 28, 1866.

2,575.—CONSTRUCTION OF LAMPS FOR BURNING VOLATILE OILS OR SPIRITS, ETC.—Philip Licatens Nadt, New York City. Oct. 6, 1866.

2,681.—MEANS FOR PREVENTING, INDICATING, AND CORRECTING AN UNDUE DEGREE OF SUPERHEATING OF STEAM IN STEAM BOILERS, ETC.—Norman Wiard, residing at present in New York City. Oct. 17, 1866.

2,718.—SEWING MACHINERY.—Lewis B. Bruen, New York City. Oct. 20, 1866.

2,739.—MACHINERY FOR MANUFACTURING CARTRIDGES.—Timothy J. Powers, New York City. Oct. 23, 1866.

2,740.—SEWING MACHINE.—Henry W. Fuller, New York City. Oct. 23, 1866.

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## ILLUSTRATIONS.


Artificial leg, Schneider ..... 283
Ash sifter, Harlow ..... 186
Augers, machine for twisting, Grier and Boyd ..... 195
Axle gage, Bamberger ..... 217
Axles, lubricating, Parsons ..... 426
Bag holder, Corbin ..... 322
Bark mill, Thomas ..... 248
Barrel machiney, Thompson ..... 331
Beehive, Taylor and Cox ..... 46
Boiler feeder, Cross ..... 213
Boiler feeder, Widgeon ..... 300
Boiler furnace, Clark ..... 202
Boiler, steam, Connery and Pennypacker ..... 15
Boiler, steam, Tanger ..... 6
Bolt cutter, Rodgers ..... 252
Boom and gaff, Manning ..... 228
Boot, ventilating, Perry ..... 282
Borer, earth, Carey ..... 194
Bracket for window shades, Nell .. 94
Brick machine, Capron and Winchell ..... 220
Brick machine, Seeley ..... 279
Brick machine, Wolliston ..... 63
Broom head, Spaulding ..... 66
Bullet, patched, Peck ..... 314
Cane knife and stripper, Conarroe. 228
Cane stripper, Bishop and Gladden 286
Cannon, breech-loading, Miller .... 86
Car truck, suspension, Strait ..... 186
Chair and cradle, Berney ..... 348
Chuck jaw, Staub ..... 319
Churn, Bailey ..... 126
Churn, automatic, Wilson ..... 367
Churn dasher, Spencer ..... 400
Collar fastening, Hodgkins ..... 110
Connecting link, Thompson ..... 142
Cooking apparatus, Kasson ..... 229
Cotton-bale tie, metallic, Le ..... 330
Cotton clearer, Veber ..... 426
Cravat holder, Hart ..... 14
Coupling, car, Parsons ..... 70
Coupling, shaft, Ruggles ..... 2
Cultivator, corn, Stover ..... 118
Cutter, green-corn, McGill ..... 94
Drawer knob, Myers ..... 374
Drill chuck, Olmsted ..... 22
Drill rest for grinding, Strahan .... 374
Drum or radiator, funnel, Ruth and De Long ..... 267
Elevator for mines, Williams ..... 263
Engine, caloric, McDonough ..... 19
Evaporator, sorghum, Riggs ..... 130
Flax breaker and dresser, Abbot .. 390
Furnace, moist warm-air, Whittingham ..... 245
Gage cock, Henke ..... 30
Gas-pipe tongs, Bannister ..... 78
Gate supporter and latch, Ketchum 262
Grate bars, hollow, Nevins ..... 62
Gun and projectile, Broadwell ..... 166
Gun, revolving, Milburn ..... 370
Hammer, dead-stroke power, Shaw 134
Hammer, dead-stroke, Shaw and Justice ..... 383
Hat rack, Keener ..... 186
Hedge trimmer, Oliver ..... 278
Hoe, weeding or scuffle, Allen ..... 278
Hook and holder, Gschwind and Grether ..... 278
Horse collar, Durfee ..... 319
Hydrant, Biggs and Flinn ..... 54
Hydrant, non-freezing and non-wasting, Clark ..... 159
Husker, harvester, and stacker, Manlove and Green ..... 230
Journal box, self-lubricating, Rice and Miller ..... 30
Kerosene chandelier, Adair ..... 38
Knife and scissors sharpener, Russ 270
Lamp chimney, Appleby and Gould 86
Lamp top, Irwin ..... 38
Lathe, spoke-turning, Gleason ..... 142
Litter and ambulance, wheeled, Tompkins ..... 270
Lock, magnetic safe and bank, Sargent ..... 297
Loam, fancy, Duckworth ..... 179
Mangle, improved ..... 158
Millstones, bushing, adjusting, etc., Weston ..... 22
Mop wringer, White ..... 178
Movement, Rowell ..... 94
Nail Extractor, Hogan ..... 202
Needle gun, the Prussian ..... 150
Oil cup, Hagenmeyer ..... 163
Oil wells, device for, Christian ..... 19
Oiler, Holt and Thompson ..... 78, 118
Oiler, King ..... 134
Oiler, spring-top, Olmsted ..... 286
Piston packing, Jacobs ..... 70
Planing machine, Dixon ..... 162
Plow, gang, Hutchinson ..... 349
Plug for steam boilers, fusible, Smith ..... 158
Potato washer, Williams ..... 356
Printing gage, Thyng ..... 332
Propelling steam vessels, Kinkel and Hubbe ..... 127
Pulley, Birdsall ..... 102
Pump, lifting and force, Andrews. 244
Pump, liquor and transfer, Tully and Reece ..... 178
Pump, rotary, Heald and Sisco .... 304
Quartz stamper, patent ..... 31
Railroad switch, self-adjusting, Zinn ..... 244
Railway, elevated atmospheric, Caryl ..... 111
Regulator for steam engines, Douglas ..... 143
Roofing, metallic, Becker ..... 150
Rudder, ship's, Le Pelley ..... 315
Sad iron, Rehorn ..... 374
Sash support, Elliott ..... 126
Sash support, Toshach ..... 102
Saw gummer, Dole ..... 14
Saw horse, Fay ..... 338
Sawmill lever set, Stanton ..... 318
Sawmill trestle, Coddington ..... 366
Screw driver, Eversol ..... 182
Screw plate, Zillier ..... 390
Shingle machine, Connett ..... 79
Ship windlass and coil separator, McGill ..... 212
Shoe calks, adjustable, Litzenberg. 244
Shoe cleaner, Newbury ..... 220
Station indicator, P. E. and J. P. Gruger ..... 314
Steam engine, combined, Huntoon 212
Steam generator, Bell ..... 419
Steam engine, portable, Bellows and Whitcomb ..... 3
Stopper and discharge spout, Myers ..... 198
Stove attachment, Elliott ..... 110
Stove tongs, Stilwell ..... 400
Stove-pipe furnance, Morse ..... 249
Swage for saw teeth, Emerson .... 34
Table-leaf supporter, Cavender .... 228
Toilet glass, Chappell and Godden. 50
Torpedo, petroleum, Roberts ..... 54
Towel rack, Hotchkiss ..... 46
Trap, animal, Ellis and Albertson .. 236
Trap, animal, Pitman ..... 62
Tube cutter, Thomas ..... 386
Turning lathes, universal box for, Wolfenden ..... 382
Turntable pivot, Kinsey ..... 356
Tweer iron, Bayliss ..... 419
Valve, balanced governor, White .. 1
Valve, diaphragm, Allen ..... 6
Valve, float, Heald ..... 322
Valve, globe, Worcester ..... 335
Valve, governor, Snow ..... 352
Vise, parallel, Flora ..... 252
Wagon and carriage spring, La Baw and Campbell ..... 296
Wagon-bow fastening, Scott ..... 400
Wagon jack, Dunn ..... 216
Wash basin, Knoepke ..... 62
Washing machine, Davenport ..... 47
Water closet, Pettit ..... 236
Water elevator, Woodworth ..... 286
Water power, combination, Kratzer 338
Water closet, Wellington ..... 419
Wheel, double-power, Wynkoop ... 334
Wheel, turbine, Swain ..... 95
Wood-bundling press, Green ..... 194


## MISCELLANY.


### A

Abbatoir for New York ..... 120, 298
Acetic acid and acetates from wood vinegar ..... 387
Acids, test for ..... 228
Acids on steel, action of ..... 390
Acoustic phenomenon ..... 197
Age of stone in China ..... 212
Agricultural exhibitions ..... 132
Agricultural machines, trial of ... 34, 48
Air furnace, trouble with ..... 35
Aluminum, home-made ..... 68
American antiquities ..... 184
American engines, English shipbuilder on ..... 31
American fire-arms, the first ..... 264
American gun-makers, opportunity for ..... 234
American Institute—Polytechnic Branch ..215, 231, 268, 318, 371, 385, 421
American invention, progress of ... 262
American railway wheels in England ..... 366
American Social Science Association ..... 283
American tools, let Americans use 36
Anthistometer, or measurer of resistance ..... 390*
Arnor-plate fastenings ..... 196
Army, the Prussian ..... 93
Artesian wells, inprovement in constructing ..... 196
Artists and artisans ..... 135
Atlantic cable ..34, 50, 79, 102*, 162
Atlantic cable of 1865 ..... 247
Atlantic cable, the broken ..... 236
Atlantic telegraph charges ..... 103 (2)
Atlantic telegraph—its present and probable uses ..... 237

### B

Balloonists in peril ..... 49
Banquet to Cyrus W. Field ..... 352
Barometer, self registering ..... 50
Beef in England, South American. 287
Beehive, primitive ..... 110
Belladonna an antidote for opium ..... 220, 268
Bellerophon, the iron-clad ..... 195
Belts, transmission of power by ... 51
Belting, measuring ..... 423
Blasting, scientific ..... 353
Bleaching process, cold ..... 184
Bleeding from the nose ..... 131
Blowing cave ..... 178
Board measure ..... 100
Boiler experiments, interesting .... 336
Boiler explosion, a queer ..... 262
Boiler explosions not always mysterious ..... 305
Boiler explosions, prevention of ... 339
Boiler, an inefficient ..... 129, 183
Boiler plates, thickness of ..... 221
Boiler, steam, a weak ..... 20
Boilers, locomotive ..... 15, 38
Boilers, notes on ..... 96
Boilers, pressure in ..... 68
Bombshells, explosion of ..... 126
Boots and shoes ..... 80
Breathing—out of doors and in the house ..... 151
Breech-loaders, an unbeliever in .. 100
Breech-loaders and patched rifle balls ..... 160
Breech-loaders vs. muzzle-loaders ..... 99, 183
Breech-loading guns in Vienna, trials of ..... 333
Breweries of Chicago ..... 351
Brick mold, glass ..... 19
Bridge walls in boiler setting ..... 115
Bullets, pressed and cast ..... 228
Business, modern methods of ..... 116
Butter for cooking, rancid ..... 187

### C

Cable of 1865, recovery of ..... 187
Cable, telegraphic ..... 83*
Calico, machine printing of ..... 333
Calico printing, engraving for ..... 317
Calcium light in war ..... 298
Canal, the Suez ..... 248
Cannon, casting of a twenty-inch .. 97
Capital and labor, copartnership of 339
Carbonic acid gas, liquefaction .... 424
Car springs, old rubber ..... 215
Cartridge box, improved ..... 94
Cartridges, elastic ..... 178
Cartridges, manufacture of ..... 252
Cartridges—Patent Office decision. 320
Cast steel, American ..... 114
Cement, a new ..... 182
Cement, millstone ..... 83 (2), 115, 164
Cementing tin and glass ..... 84
Chafing, to prevent ..... 19
Chemical notes ..... 82, 147
Children of mechanics ..... 65
Chilled iron, softening ..... 184
Chimney drafts ..... 233
Chimogene—a new anesthetic ..... 50
Cholera—sources of, and means of avoiding them ..... 128
Churn, Ryerson's ..... 16
Circle, squaring the ..... 301
Coal gas, inflammability of ..... 220
Coal, iron, and oil ..... 382
Coal—its origin and nature ..... 237
Coal, the combustion of—economy in fuel ..... 271
Coffee making ..... 52
Coffee and its adulteration ..... 426
Colors on the retina, persistence of 283
Colors in relation to artificial light 370
Combination tools patentable ..... 219
Combustion of coal in ships, spontaneous ..... 120
Commerce on the Atlantic, Steam ship ..... 248
Concrete for building purposes .... 218
Cooper Union free school ..... 231
Correlation of the physical forces .. 217
Correspondence, special ..... 80, 97
Corn crop ..... 161
Cotton, foreign ..... 114
Cotton Manufacture ..... 423
Counselling our enemies ..... 119
Cutting garments by machinery .... 114
Cryptography ..... 55

### D

Decision, important—Does "cash" mean gold ..... 318
Decision, important—Tanner's patent ..... 103
Decision in interference case ..... 69
Digits, a new system of ..... 49
Dining, the art of ..... 196
Disinfectant—carbolic acid ..... 167
Disinfectants, Crookes on ..... 1, 146
Distilling, improved mode of ..... 338
Dress, our new ..... 19
Dundas cultivator reissue ..... 351
Dyeing fabric and yarn ..... 146

### E

Electric machine wanted, small ... 351
Electricity, inclosing ..... 335
Enamel, waterproof, for card photographs ..... 22
Encourage the small things ..... 155
Engine, portable, the Wood and Mann ..... 204
Engines of the Rising Star ..... 135
Engines, the Lord Warden's ..... 86
Engineering, honors to mechanical 5
Erie Basin Dry Dock Company .... 356
Errors in transposing figures corrected ..... 336
Exhibition, Paris universal ..... 7, 164
Exhibition, the Brazilian ..... 128
Experiments, duty of recording .... 167
Explosion, a very singular ..... 348
Explosion of lamps ..... 184
Exports of the world ..... 370

### F

Farm, largest in the world ..... 14
Feed, long ..... 36
Fire-crackers should be prohibited 55
Fire engines, improvement in ..... 178
Fire engines, steam ..... 132, 183
Fire and sunshine experiments .... 234
Fire in a coal mine ..... 184
Fire lighting in olden times ..... 199
Filter, a disinfecting ..... 114
Fleas ..... 82, 132, 164
Flying machines ..... 63
Fogs, clouds, and rains in the mountains ..... 420
Foreign items ..... 84
Foreign scientific news ..16, 98, 216, 234
Forests—effect of their removal .... 367
Forest rees, o ultivation and uses, 421
Forgings, heavy ..... 81
Franklin Institute ..... 296
Friction match, burning of ..... 231
Frigate Chattanooga, trial of ..... 38
Fuel, new steamboat ..... 4
Fuel, using—managing bituminous coal ..... 305
Furnace for chemical experiments, cheap ..... 14
Fumigating ..... 187

### G

Galaxy, the ..... 30
Gages for iron work ..... 287
Gas for less than nothing ..... 120
Gas, new material for producing .. 216
Gas, new method of generating .... 298
Gas odors ..... 228
Gas project, new ..... 267
Gas purification ..... 280
Gas retorts, clay vs. iron ..... 68
Gases in guns, transverse force of. 167
Gases, their wedging when confined ..... 131*
Goulding's Patent ..... 423
Glass, a new way of cutting ..... 234
Grain—how stored in New York ... 182
Grain elevators—grain trade ..... 249
Granulation of blast-furnace slags. 81
Grasshopper scourge ..... 234
Gun barrels, bronzing ..... 296
Gun paper ..... 2
Gun, the Ames ..... 4
Gun, the non-recoil ..... 4
Gun, the Palliser ..... 213
Gunpowder, new kind of ..... 298
Gun trial in England ..... 143
Gun—why it heats on firing ..... 16, 115
Guns, English and American ..... 304
Guns, Fraser ..... 319
Guns, heating them by concussion 84
Glass, soluble ..... 371
Gut cord and belt ..... 182
Gutta percha, how obtained ..... 94

### H

Hailstorm phenomenon ..... 100
Haircloth, manufacture of ..... 81
Hair restoratives, patent ..... 197
Heat, developing ..... 132
Heated term—how to keep cool .... 68
Honor to whom honor is due ..... 231
Horn, dyeing of ..... 338
Hyposulphites, removing ..... 66

### I

Ice pitcher, cheap ..... 47
Idea—associated effort, etc ..... 165
Improvements going on South .... 131
Improvements, useful, not opposed to the harmony of nature ..... 221
Indigo, whence comes ..... 217
Inconsistency, a strange ..... 67
Infection, power of ..... 162
Inlaying ..... 267
Insurance ..... 70
Insurance against steam-boiler explosions ..... 129
Inventor an unfortunate ..... 82
Inventor, the first to make his invention useful ..... 52
Invented wanted—copying paper .. 197
Inventors and patentees, a word to 203
Inventors' commission agency .... 267
Inventors, important to Southern. 232
Inventors, their labors and rewards 87
Inventors, unscientific ..... 200
Inventions patented in England by Americans ..... 235, 251, 269, 320, 373
Iron and copper resources of Great Britain ..... 197
Iron and steel ..... 301
Iron and steel, American ..... 283
Iron belt, the great ..... 374
Iron-clads, vulnerability of—the Shoeburyness experiments. 270, 300
Iron-clads, by a U. S. navy officer. 375
Iron mountain in Sweden ..... 213
Items from the British Association 196
Inks, sympathetic ..... 302
Ivory, coloring ..... 387

### J

Jamaica—a field for inventors ..... 265
Japan ..... 351
Journal, value of a scientific and mechanical ..... 427
Jungles on fire ..... 247
Just measure ..... 23

### K

Kaolin works ..... 143
Kerosene oil, spontaneous explosion of ..... 330
Kerosene telegraph ..... 168

### L

Labor, subdivision of ..... 119
Land slide, singular ..... 267
Lead pencils, manufacture of ..... 145
Leaves, the change of ..... 181
Law of Mariotte ..... 422
Letter from a "Reb." ..... 282
Levees, the Mississippi ..... 100
Life-saving machine ..... 160
Lightning conductors ..... 250
Lightning, freak of ..... 94
Lightning, power of ..... 93
Lightning, protection against ..99, 118
Lightning-rod insulation ...148, 164, 250
Lightning-rod question ..... 218
Locomotive works, West Albany .. 264
Lumber—securing it on wagons ... 194

### M

Machinery of the Dunderberg ..... 144
Machinery vs. manipulation ..... 271
Machinery wanted for oil mining .. 33
Madstone ..... 249
Madstone—a delusion ..... 299
Magnesium light, new ..... 36
Magnetic electricity ..... 36
Manganese, black oxide of ..... 200
Man holes and safety valves ..... 39
Manufactures as a means of wealth 213
Manufactures, Austrian, injured by the war ..... 196
Manufactures in Hartford ..... 266
Manure, well-rotted ..... 146
Marine disasters, the late ..... 278
Marine, our commercial ..... 71
Mariner's compass—how to find its variation and attraction ..... 37
Measuring logs ..... 52
Meat, recipe for curing ..... 317
Meats, fresh—their transportation to market ..... 323
Meats, McCall & Sloper's process for preserving fresh ..... 421
Mechanic—his influence in politics 22
Mechanics' and agricultural fair ... 271
Mechanics, educated ..... 23
Mechanics' fair at Worcester ...246, 264
Mechanics needed ..... 218
Mechanical nonsense ..... 151
Medicine, modern ..... 391
Meerschaum and amber ..... 161
Metal, what is a ..... 194
Meteor, a green ..... 335
Meteors, the November ..... 319
Meterological phenomenon ..... 200
Meteoric shower, the tricennial .... 336
Metric system, the proposed ....50, 140
Minautonomah at Queenstown ..... 34
Millers, questions for ..... 68, 100
Mills for grinding paints and printers' inks ..... 84
Millstones, filling for ..... 162
Moire antique ..... 181
Molds for casting iron, steel, etc... 314
Money standard, a uniform ..... 305
Monitor engines ..... 62
Monitors and heavy guns in Sweden 230
Monitors, sea-going ..... 130
Mosquitoes ..... 132
Mutual dependence ..... 126

### N

National Academy of Sciences ..... 131
Navy, a new ..... 112
Navy, growth of our ..... 2
Necrosis produced by tobacco ..... 114
Needle gun ..... 71, 129, 351
Negatives, intensifying after varnishing ..... 330
Newspaper enterprise, the *Sun* .... 214
Nitro-glycerin ..... 267
Nitro-glycerin as a substitute for gunpowder ..... 322
Nitro-glycerin, experiments with .. 55
Nitro-glycerin, use and abuse of ... 335
Nitro-glycerin used in blasting rock ..... 195
Notes on new discoveries and applications of science ..... 34
Numerals, the Arabic, representative characters ..... 266, 323, 353

### O

Oil Creek, a week on ..... 144
Oil di-tricts of Canada ..... 334
Oil, first found in Pennsylvania .... 113
Oil men and miners, interesting to 3
Oils, weight of ..... 52
Ordnance, enlargement test for .... 160
Organ at Plymouth church ..... 110
Osiers, cultivation and manufacture of ..... 214

### P

Pacific railway, progress of ..... 356
Paper money, volume of ..... 214
Paris exhibition building ..... 391
Paris universal exposition ..... 232
Patent dealer, must he take out a license? ..... 183
Patent case decided, important .... 330
Patent Office decision, cultivators. 358
Patent swindling ..... 102
Patents, change in the style of ..... 357
Patents in Congress again ..... 7
Patent laws, Canadian ..... 82, 39, 78
Patents, legislation on ..... 23
Patents, the Commissioner of ..... 253
Peat manufacture ..... 163
Peat, manufacture and combustion of ..... 386
Peat, origin and composition of ... 369
Pen, its construction and use ..... 145
Personal ..... 68
Petroleum and sperm oil as lubricators ..... 314
Petroleum formed from seaweed .. 144
Petroleum, inflammability of ..... 151
Phosphorus, separating it from metals ..... 281
Photo-medallions ..... 304
Photographs ..... 68
Photographic art ..... 314
Photographic slides for magic lanterns, coloring ..... 193
Photograph, submarine ..... 215
Photography and kalledoscope .... 98
Photography, colors in ..... 330
Photography, statistics of ..... 351
Photographing a volcano ..... 98
Photographs, popular ..... 299
Photographing cannon balls ..... 132
Pickling castings ..... 143
Pier and warehouse system for New York ..... 427
Piston, its place when the crank is vertical ..... 267, 353. 423
Piston of a steam engine ..... 115, 163
Piston question ..... 250
Planer, a four-tool ..... 23
Planing knives, long—hardening them ..... 161
Plants, useful ..... 2
Plumbago in Georgia ..... 338
Poisonous bites—madstones ..... 162
Polar ice and the Gulf Stream ..... 168
Pole, the north—Spitzbergen ..... 181
Porcelain and opalescent glass ..... 320
Porcelain process and developer .. 215
Postal money orders, and bankers' drafts ..... 298
Power gained by a lever ..... 330
Prairies—wood on them ..... 164 (2)
Practical hints ..... 257, 368, 390, 426
Precipitation of metals by magnesium ..... 130
Preserving green peas ..... 132
Preserving meat, three processes for ..... 214
Printing surfaces produced by photography ..... 370
Printing of woven fabrics ..... 199
Public work in Holland ..... 374
Pulleys, large and small ..... 35
Pulleys, wrought-iron drums for ... 62
Pyrophorus ..... 115

### Q

Quartz, auriferous, extracting the metals from ..... 230
Queen's portrait for Mr. Peabody. 66

### R

Rags, importance of ..... 71
Rails, life of steel and iron ..... 426
Railroad disaster, an extraordinary ..... 16
Railroad in the Alps ..... 244
Railroad, Pacific, progress of ..... 237
Railroad tracks, iron and steel .... 127
Railroads and telegraphs in South America ..... 168
Railway carriage signals, English. 198
Railway engineering in London ..... 332, 363
Railway, elevated, for New York city ..... 119
Railway enterprise, a great ..... 18
Railway over the Alps ..... 232
Railway tariffs, European ..... 424
Railway, the pneumatic ..... 298
Railway trains, heating ..... 297
Railway wheels, chilled ..... 366
Rain gages and rain fall ..... 118
Rail-ing vessels, experiments in .... 234
Rebuilding Charleston ..... 138
Recipes ..... 67
Reissue of Letters Patent, law applicable to ..... 21
Reproduction of drawings, etc .... 197
Rifle shooting ..... 66*
Rifle, Springfield, report on ..... 86
Rifles, breech-loading ..... 36
Rifle practice ..... 426
Rifles, the Lindner and Remington 163
Rinderpest, pleuro-pneumonia and cholera ..... 39
Roads, common, building of ..... 39
Rose, the ..... 270
Rose-wein, the Bremen ..... 216
Russian railroads and the Krupp guns ..... 388

### S

Safety valves ..... 165
Safe lock ..... 351
Safes, how burglars operate on .... 79
Safes, iron, are they safe ..... 55
Salt, do animals require ..... 168
Salt, its uses and production ..... 146
Salt, usefulness of ..... 371
Salt works, the Onandaga ..... 202
Sawing lumber ..... 160, 181
Saw, how kept in order ..... 51, 83
Saw question, the circular ..... 253


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Saws and saw filing.....83*, 183
Saws, circular.....20
Saws, cracked circular, repairing.336
Saws, lateral motion.....164
Science, influence of.....220
Scientific American, enlargement for 1867.....357
Scientific American in Texas.....323
Screw plates, improvement in.....390
Sea, depths of the.....143
Self-holding plow.....428
Serpents, charming by.....316
Sewing machine and shoe manufacture.....46
Shingle machine, Low's.....4
Ship building in this country, the first.....229
Ships in a gale, salvation of.....301
Ships, iron-clad.....5
Shoddy, its material and manufacture.....202
Shot, chilled.....230
Shot, chilled, the Shoeburyness experiments.....287
Shot guns.....250, 284, 374
Shot gun, scattering.....423
Signal code, a universal.....284
Signals, a simple code of...148, 165, 183
Signals on English railway trains.338
Silk, culture and manufacture of 7
Silk spinner of South Carolina.....126
Silver plating.....384
Simpson process.....287
Skating at the sea side.....168
Skids, circular.....385
Sleeping cars, profits on.....113
Smelting Lake Superior copper ore 114
Snake story.....165
Soda, obtaining it from salt.....114
Sodium amalgamation.....33
Soldering, how to make it fluid...165
Sorghum red.....70
Southern fair.....392
Specimen, a unique.....114
Spectroscope and its revelations. 17*
Spider, a poisonous.....80
Squadron, our European.....68
Star, variable.....18
Steam and the steam engine.....335
Steam as a motor.....182
Steam boilers, circulation in.....353
Steam, disinfecting by.....87
Steam engine indicator.....65
Steam ferries of New York.....391
Steam, is it a gas.....253
Steam on common roads.....47
Steam ports, area of.....422
Steel, American.....187, 232
Steel, changes in it by friction and heat.....388
Steel, homogeneousness of, tires, axles, and rails.....279
Steel, singular quality in.....297, 320
Stove, an ancient.....19
Success, gratifying.....183
Success the popular estimate of value.....103
Sugar, beet-root.....47
Sun—its apparent position.....348
Sunshine—its effect on fire.....159, 218
Surgery in accident, practical.....371
Sweet corn all the year.....113

T

Tape worm and pork eaters.....52
Target experiments at Fortress Monroe.....247
Target test with large guns.....231
Target, the California.....115
Tea culture in America.....419
Tea, profits on.....33
Telegraph instrument wanted self-adjusting.....385
Telegraphic blunders.....184
Temperature, measuring and regulating.....115, 200, 250
Temple of the muses, immense.....66
Theatres, method of lighting.....297
Theory of the diffusion of steam, Williams's.....180
Thread from cotton-plant stalks...38
Timber, its preservation from the teredo.....35
Timber, production of.....71
Timber, the value of.....7
"Time will tell".....356
Time, use of, and uselessness of hurry.....244
Tobacco, boys using.....142
Toning process, Pine's.....114
Tool, an absurd.....103
Tools, cleanliness of.....270
Tools for special and for general use.....135
Tools, good, advantage of.....82
Tornadoes, theory of.....147
Tower clock, a fine.....80
Toy business in this country.....221
Traction engines and roads.....198
Trade with Europe, direct.....214
Trees, the most useful of.....334
Trichiniasis.....38
Tubes, punched, and gun barrels...231
Tunnel, the Anglo-French Channel 203
Tunnel, the Channel.....283
Tunnel under Chicago river.....79
Turbine wheels, steps for.....200
Turret, testing a.....49
Twenty-five years—a retrospect...180

U

Utilization of waste substances....387
University law school.....30
Universe—its final fate.....203

V

Valves, safety.....253
Valve, throttle.....215
Variation in form not patentable..52
Ventilation, its necessity and neglect.....323
Ventilation of the National Capitol 375

W

War and a nation's debt.....184
War engineering, American.....340
War powers of Europe and America.....3
Watch springs, breaking of.....165, 198
Water spouts in the mountains.....349
Water supply for Philadelphia.....71
Welding cast iron and steel.....183
Welding mixture.....388
Well-boring machine, improved...168
White lead, manufacture of.....145
Whitewash, silicated.....67
Why?—civid ng profits.....34
Wind, its force.....87
Wood, its preservation against decay.....187, 283, 283
Writing ink.....286
Wrought scrap iron for forgings...357


## PATENT CLAIMS.


A

Accordeon.....59
Acetate of alumina, manufacturing.....325
Acetate of lead, manufacture of....75
Aerating and mixing substances...342
Air, carbureting 11, 27 (2), 138, 155, 172, 174, 188, 190, 206, 258, 290, (343 (2), 393
Air charged with gasolin.....430
Air, etc., carbureting.....256
Air engine or motor.....254
Air, supplying it to air chamber...155
Alcohol, etc., manufacture of.....379
Alchohol, rectifying.....310
Alloy.....138
Almonds, peeling.....327
Alphabet blocks.....359
Alphabet frame.....256
Amalgamator.....208, 224, 240, 306
Ambulance.....342
Anchor.....153, 223
Anchor stopper.....120
Anvil and vise combined.....72
Anvil for making horseshoes.....59
Apparatus for agitating and heating substances.....26
Apparatus for applying liquids to cast s.....74
Apparatus for bleaching pulp and drying paper.....105
Apparatus for heating and cooling air, etc.....60
Apparatus for making paper pulp, bleaching, etc.....24
Apple parer.....378, 379
Apple parer and corer.....154
Arch for bridges, etc., cast-iron...412
Artificial arm.....173
Artificial caoutchouc.....70, 273
Artificial eye.....12
Artificial hand.....73
Art ficial leech.....327
Artificial leg.....9, 123, 188
Artificial limb.....57, 241
Artificial teeth, attached to bases. 190
Artists' materials, drying.....429
Artists' stretcher.....224
Ash, pot and pearl, manufacture of.....189
Ash sifter.....223, 393
Assorting potatoes, coal, etc., machine for.....238
Auger, hollow.....74, 255, 274
Augers, tool for finishing.....41
Awning.....358
Axes, mode of securing on their handles.....58
Axle and journal for carriages....136
Axle box.....122, 188, 207, 360 (2), 395
Axle box cover.....273
Axle box for carriages, self-lubricating.....377
Axle, carriage.....324
Axle nut for wagons, etc.....378
Axle spindles, fitting to wagon skeins.....275
Axles, attaching draft pole to.....395
Axles, attaching hub to.....239
Axles, carriage, anti-friction.....90
Axles for machinery, anti-friction.. 275
Axletrees, screw clamp for bending.....380
Axles machine for making.....137

B

Baby jumper.....25, 257
Bag fastener.....121
Bag holder, .....73, 188, 361, 410, 412
Bag, woven.....42
Bag, traveling.....413 (2)
Bail for kettle, etc.....238
Bakin pan.....62
Balance weight.....411
Bale fastening.....208
Baling hay.....58
Baling press.74, 238, 257, 327, 378, 412, 429
Ballon, marine.....207
Bande ore.....376
Banjo.....172
Bark upon trees, tool for plitting. 172
Barn doors, fastening for.....325
Barrel and keg.....256
Barrel bung cutter.....430
Barrel for petroleum, etc.....139
Barrel hoop, etc.....137, 30
Barrel lifter.....191
Barrel machine.....275, 288
Barrel or cask.....204
Barrel, tapping.....120
Barrels, composition for lining.....123
Barrels, making plugs for.....359
Basket.....429
Bat, spring.....327
Battery connection, car on.....26
Batting and wadding.....428
Beans, machine for harvesting.....224
Bed bottom...10, 58, 89, 105, 123, 124, (2), 138, 154, 172, 189, 190, 254, 258, 274, 396, 343
Bed bottom, spring..10, 43, 57, 72, 74, 91, 105, 107 139, 205, 291, 358, 360, 429
Bedbottoms, spring holder for.....377
Bedbugs, protector against for bedsteads.....40
Bedbug trap.....153
Bed, fracture.....153
Bed springs, forming eyes of.....310
Bedstead fastening.....255, 377 (3)
Bedstead, invalid.....57, 72, 359
Bedsteads, applying them to apartments.....272
Beehive.....40, 43, 57 (2), 88, 106, 152, 206, 239, 272, 273, 274 (2), 290, 324 (2), 341, 343, 359 (2), 360
Beer, alcohol, etc., cooling and condensing.....11
Beer cooler.....139, 395
Beer, etc., vessel for.....324
Beer on draft, preserving.....361
Bellows.....56, 59
Bells, hanging.....56, 308, 309
Bell buckle.....355
Belt clasp.....379
Belt coupling.....105, 122
Belt guide.....205
Belting, hose, etc., manufacture of 58
Belt lacing, machine for cutting...207
Bench hook.....138, 257
Bevel age.....11, 40, 74
Bicarboate of soda, potash, and hydrochloric acid.....170
Bilge-water gage.....105
Billiard game-keeper.....155
Billiard register.....255
Bill and table.....11
Billiard tables, attachment for legs of.....240
Binding for india-rubber and other fabrics.....73
Bird cages, musical attachment to. 73
Bit, countersink.....412
Bit stocks.....238, 325
Bit, upper jaw.....324
Blacking.....172, 378
Blacking box.....154
Blacking brush.....3, 9, 412
Blacking case and light chair.....88
Blasting cartridge.....273
Bleaching fibrous materials....174, 291
Bleaching palm, straw, etc.....107
Block and tackle check.....153
Blotting pad.....380
Bower.....56, 429
Blow pipe.....152, 223, 395
Boat for traveling ice.....289
Boat, portable.....9
Boats, detaching from davits...310, 410
Boats, lowering.....289
Body comformators.....120
Bog cutter.....106
Boiler explosions, device to prevent.....24
Boiler feeder.....42, 104, 379
Boiler-flue brushes.....394
Boiler for culinary purposes.74, 90, 430
Boiler for gas heater.....289
Boiler furnace, damper regulator for.....342
Boiler heads, bending flange upon 10
Boiler tubes, cutting.....290
Boilers, preventing incrustations of.....379
Boilers, removing incrustations from.....139
Boilers, stationary steam, setting.. 27
Boilers, steam, mode of covering.. 8
Bolster plate for wheeled vehicles. 380
Bolt.....222
Bolt cutter.....361
Bolt-heading machine...8, 9, 57, 223, 309
Bolt keeper.....291
Bone bolting establishment, disinfecting.....136
Bonnets machine for pressing.....258
Bookbinder, school boy's.....292
Bookbinder's paper cutter.....256
Book binder's sewing table.....325
Book holder.....26, 27 (2)
Book-mark holder.....414
Books and manuscripts, holding...56
Books, cutting frons of.....325
Boots and shoes.....9, 10, 25, 121
Boot and shoe bottoms, facing.....9
Boot and shoe edge parer.....171
Boot and shoe stretcher.....8
Boot heel.....123, 222, 379
Bootjack.....362
Bootjack and blacking case.....238
Boot tree.....376
Boots and shoes.....72, 326, 341, 394
Boot and shoe irons.....412
Boot, ventilating.....154
Boots and shoes, apparatus for cleaning.....58
Boots and shoes, lacing for...25(2), 27
Boots and shoes, stretching lengthwise.....379
Boots and shoes, wrinkling instep 325
Boots, manufacture of.....152
Boots, mode of cutting.....24
Boring and grinding apparatus....104
Boring attachment to lathes.....239
Boring machine.....27, 124, 272
Boring tool to make wood screw legs. 190
Boring wells and laying pipes.....75
Boring well, machine for.....191
Bosom, paper and cloth.....40
Bottle stopper.....42, 72, 88, 153, 154, 224 (2), 414 430
Bottle stopper and medicine gage.. 378
Bottles, fastening for.....91
Bottles, glass, grooving the mouths of.....40
Bow pin for ox yokes.....205
Box for toacco and matches.....137
Box setter for carriage wheels.....343
Boxes for caustic alkali.....394
Brace and lacing device.....292
Brace, eyeleted.....292
Bracket scaffold.....410
Braiding machine.....90, 138, 155, 289
Brake for wagons.....412
Brakes for cotton lappers.....292
Bran duster.....378
Brass tubes, embossing.....395
Bread, apparatus for raising.....40
Breast pin.....291
Breast protector.....430
Brest-strap hook.....174
Breeching hook.....394
Brick and brick kiln....170, 224, 292, 394
Brick for ceilings.....156
Brick machine..25, 104, 107, 137, 155, 174, 188, 206, 238, 274, 307, 308, 325, 378, 394, 411, 412, 428
Brick, making.....9, 90, 105
Brick mold.....124
Brick or building blocks.....428
Bridge.....41, 105, 223, 239, 308, 412, 430
Bridle.....57, 359, 392 593, 413
Bridle bit.....105, 120, 121
Bristles, machine for assorting.....326
Broom.....104, 362
Broom clamp.....393
Broom head.....12, 25 (2), 27 (2), 42, 43, 56, 73, 74 (2), 90, 107, 122, 153, 154, 207, 307, 340, 341, 394 (2), 412, 414
Broom head and clamp.....154
Bronzing machine.....171
Brush.....12
Brush for boiler flues.....24
Bucket hoop, gap.....8
Buckle.....11, 25, 27, 89, 108 (2), 174, 190, 275, 379, 410, 414
Buckle and ring.....273
Buckle and strap, metallic fastening for.....274
Buckle, trace.....90, 104, 136
Buggy top, shifting.....10
Buildings, constructing.....362, 430
Buildings, moving.....306
Bungs.....91, 413
Bungs from barrels, xtracting.....73
Buoying vessels, apparatus for.....107
Burglar Alarm.....11, 12, 58, 74, 327, 392, 411
Burglar alarm and door fastener..74
Burial case.....172
Burner, aero-gas.....122
Burner, coal oil.....43, 91
Burner for vapor lamp.....239
Burner, hydro-carbon.....44, 341 431
Burner, lamp....57, 223, 238, 257, 291, 344, 359, 362, 376
Burner, tubular wick.....379
Burner, wick, for heating and cooking.....205
Burning fluid..26, 136, 154, 189, 190, 225, 291 3?4(2), 377
Burning liquid hydrocarbons.....155
Burr box for burring machines.....58
Burying weeds and stubble while plowing.....152
Bus for blinds.....9
Butt hinge.....27
Butter and lard, covered tub for...207
Butter, coloring matter for.....393
Butter dish.....414
Butter from cheese whey.....430
Butter tongs.....121
Butter worker.....11, 25, 393
Butter worker and mold.....43
Butter worker and packer.....306
Button.....58, 136, 140, 172, 240 (2), 308, 412
Button machine.....170, 325, 395
Button fastener.....412
Buttons, chuck for holding.....413
Buttonhole cutter.....56, 138, 153, 173
Button ole cutter and re-enforcer. 392
Buttonhole organizer collars.....11
Buttonhole maker.....273

C

Calendar.....74, 121
Calipers, making.....59, 173
Camera, solar.....410
Can opener.....26, 344
Cans, etc., screw mouth pieces to..171
Can sh et metal, opening.....72
Canalboat, deck for.....324
Canceling apparatus.....325
Candle holder.....58, 240
Candle molding, tubular plunger for.....342
Candles, paraffine.....37
Cane handle.....154
Cane juice, defecating.....413 (5)
Cane juice, mode of treating.....206
Cane juice, separating gum from..223
Cane mill.....379
Cane stripper.....40, 222
Canisters, measuring stopple for...240
Cap.....189, 308
Cap for bottles.....239
Cap for mucilage bottle.....255
Capstan winch.....9
Capstan windlass.....222, 393
Car bell.....395
Car brake, 9, 28, 41, 59, 123, 138, 223, 224, 290, 292, 326, 340, 395, 412, 414
Car brake, electro-magnetic.....377
Car coupling, 25, 40, 42, 72, 107 (2), 123, 139, 154 (2), 171, 172, 173, 188, 189, 190, 191, 206, 207, 222, 223, 255, 275, 290, 309, 344, 378 (2), 394, 395, 414 429
Car for mines, ore and timber.....74
Car, marine.....72, 91
Car pole for horse railways.....413
Car register.....341
Car replacer.....410
Car seat and couch.....138
Car-seat indicator.....288
Car spring.....41, 42, 104, 274, 341
Car spring, india-rubber.....173
Car starter and brake.....306
Car, starting.....173
Car truck.....289, 307, 359
Car-truck standard.....340
Car ventilator.....170
Car wheel.....27, 240, 275, 288
Car wheel, center chill for.....122
Cars on the track, moving.....239
Carbonate of soda, manufacturing. 8
Carburetor.....342
Carburetors, automatic feed for...255
Carburetors, feeder for.....310
Carburetors in railroad car, etc., blast for.....325
Card case.....241
Card rack.....190, 230, 255
Carding engines, stripping top flats of.....306
Carding machine.....26, 379
Carding-engine feeder.....428
Carding machines, etc., wool-oiling machinery for.....105, 258, 429
Carpenter's bench.....290
Carpenter's plane.....343
Carpet bag.....326
Carpet-bag frame,.....56, 140, 154
Carpet-cleaning machine.....171
Carbet fastener.....205, 307, 327
Carpet stretcher.....27, 273, 289, 309, 412
Carpet stretcher and tack holder..288
Carriage.....172, 344 (2), 394, 395
Carriage body, hanging.....308
Carriage curtains, elastic buttonhole for.....361
Carriage gearing.....190
Carriage jack.....288, 307
Carriage pole.....138
Carriage seat.....208, 344
Carriage seat, shifting rails for.....258
Carriage shackle,.....256, 362
Carriage tell.....191
Carriage thills, bending.....152
Carriage top.....395
Carriage-top protector.....308
Carriage top, shifting.....307, 326
Carriage tops, slat iron for.....327
Carriages, body top for.....240
Carriages, dress guard for.....290
Carriages, shifting seat for.....379
Carridge box, revolving.....106
Cartridge machine.....75, 395
Cartridge, priming metallic.....140, 307
Cartridge shells, drawing.....59
Cartridges, priming.....289
Carving table.....254
Case for medallions.....360
Cask and barrel.....289
Cask, barrel, etc.....255, 256 (2), 360
Casks and boxes, identifying mark for.....290
Caster.....9, 124, 207, 257, 290, 307, 324
Caster bottle.....74
Cast-steel castings, machine for making.....174
Caterpillars, destroying.....410
Cattle gag.....307
Cattle hitch.....124
Cattle poke.....341
Cattle tie.....11
Cement.....376
Cement, apparatus for spreading..190
Cement pipe.....394
Centrifugal machine.....171, 359
Centering and squaring device.....411
Centrifugal machines, supplying liquor to.....290
Chain cables, machine for adjusting.....137
Chain links, machine for bending..124
Chair.....89, 274, 291
Chair and desk.....88
Chair and fan, combined.....57
Chair and table, baby.....429
Chair couch, and stretcher.....34
Chair, folding.....73, 189
Chair, reclining.....137, 238, 241
Chair seat.....8
Chair, swinging.....140
Charcoal for filtering, preparing...56
Charcoal, making.....88
Cheese curing and packing hoop...360
Cheese cutter.....57
Cheese hoop.....173, 360
Cheese press.....343
Cheese vat.....9, 56, 392
Cherry stoner.....257, 327
Chess, battle war.....413
Chimney.....291
Chimney cap.....43
China grass, etc., extracting fibre from.....327
Chisels, apparatus for tempering..121
Cholera, medicine to cure.....26
Chuck.....42, 59 (2), 122, 154, 224, 274, 410, 414
Churn, 24, 27, 40, 41 (2), 42, 43 (2), 60, 73, 88, 91, 121, 124, 172, 173 (2), 189, 190 (2), 206 (2), 222 (2), 225, 238, 239, 241, 255, 273, 306, 326, 342, 359, 360, 361, 376, 377 (3), 394, 395 (3), 412, 413, 414, 429 430
Churn and ice-cream freezer.....28
Churn and washing machine.....342
Churn dasher.....8, 72, 104, 308, 377, 429
Churns, gearing for.....105
Cider and wine press.....152
Cider mill.....191, 362, 377, 378
Cider mill and fruit press.....257
Cigar.....343
Cigar holder and hat hook.....137
Cigar lighter.....257, 359
Cigar press.....8, 41, 89, 257, 379
Cigars, etc., lighting.....378
Cigars, machine for cutting off.....360
Cigars, mouth piece for.....358
Cigarettes, manufacture of.....274
Ciphering machine.....241
Cistern for water closets, etc.....307
Cistern leaders, cut-off for.....393
Clamp, bed-clothes.....429
Clamp, flooring.....136, 224, 327
Clamp for clothes line.....140, 255
Clamp for holding saws.....88
Clamp, hand-screw.....138, 378
Clamp, hitching.....308
Clamps and gages for weather boarding.....360
Clasp for belting, etc.....327
Clasp for mail bags.....223
Clasp for neckties and shirt collars 191
Clasp for skirt hoop.....43, 258
Clasp lock for books, etc.....394
Cleansing mill, founders'.....205
Clock, alarm.....222
Clock, calendar.....171
Clock case.....171
Clock movements, equalizing springs for.....361
Clock springs, tempering.....392
Cloth folder.....41
Clothes dryer, 72, 121, 137, 139, 188, 344, 390
Clothes pin.....207, 208, 358
Clothes pole.....11, 257
Clothes rack.....309
Clothes sprinkler.....27, 42, 324
Clothes tongs.....40
Clothes washer.....105
Clothes wringer, 74, 89, 91, 107, 170, 274, 307, 325
Clover-seed gatherer.....257
Clutch hook, slaughtering.....205
Coal-dumping apparatus.....258
Coal, hoisting and dumping.....325
Coal hod and sifter.....73, 171, 380, 392
Coal screen.....123
Coal scuttle and sifter..120, 137, 393, 429
Coating iron and steel with gold, silver, etc.....208
Coating metals with metal.....152
Coating sheet iron with tin, etc.191, 377
Cob and corn, grinding.....291
Cock eye.....340
Coffee huller.....27, 358
Coffee mill.....288, 292
Coffee pot.....254, 257, 413
Coffee roaster.....107, 122
Coffee, settling.....104
Coffin.....56, 58, 72, 191
Coffin nail and screw heads, finishing.....12
Coffins, ensuring scale for.....239
Coil for brewers' boilers.....11
Collar and necktie attachment....360
Collar for drill rods.....90
Collar, lady's imitation.....137
Collars, boxing paper.....413
Comb.....360, 361, 380, 398, 412
Combustion in furnaces, promoting.....239
Composition for useful and ornamental articles.....310
Composition for walks, pavements, etc.....288
Composition of matter.....27, 257
Composition to render paint fireproof.....41
Condenser.....43, 206, 208, 244
Condenser, steam.....105, 412
Condenser, surface.....394
Confection pan.....327
Cooking apparatus.....57
Cooking stove, 88, 91, 222, 273, 274, 340, 395, 430
Cooking stoves, attachment to....58
Cooking stoves, reservoir for.....124
Cooler.....152
Cooler and refrigerator.....342
Cooler for bees, etc.....205
Cooler for butter, milk, etc.....393
Cooler for grinding mills.....341
Copper, etc., engraving.....257
Copying inking machine.....153
Cordage machine.....72
Cordage, webbing, etc., making...74
Cork extractor.....290, 306, 325
Cork for mattresses, treating.....340
Corn cake machine.....54
Corn, cutting it from the cob.....8, 154
Corn husker.....152, 205
Corn planter..9, 26, 56, 91, 107, 122, 140, 188, 189, 224, 239, 240, 258, 275, 289 290 306, 358, 359, 362, 376, 412, 430
Corn planter and broadcast seeder 224
Corn planter and plow.....207
Corn planter, hand.....25, 41, 205
Corn planter, single-row.....272
Corn popper.....325
Corn sheller.....154, 306, 390, 429
Corn sheller and bean thrasher....26
Corn-stalk cutter and raker.....394
Cornet and other wind instruments 324
Cornices, plastering mold for.....274
Corrugated metallic plates.....105
Corset.....28, 106, 190
Corset and skirt supporter.....8, 57
Corset clasp.....136
Corset spring, extension in.....72
Cotton and hay press.....241
Cotton and wool picker and cleaner.....91
Cotton bale tie.....255, 290, 307, 310 (3), 342
Cotton bales, metal bands on.....310
Cotton gin.....12, 225 430
Cotton opener and cleaner.....429
Cotton pick r.....413
Cotton, preparing it for carding....326
Cotton press.....378
Cotton-seed cleaner.....414
Cotton-seed huller.....10
Cotton-seed planter..24, 58, 73, 254 (2), 288, 327, 340, 343, 376, 411
Cotton seed, to prepare for planting.....43
Cotton tie.....205, 274, 336, 344, 411
Counter supporter.....308
Coupling drill.....26
Coupling for gas fixtures, socket....74
Coupling for propeller shafts of ships.....191
Coupling for vehicles.....57
Coupling joint for well-boring shafts.....188
Coupling, rod.....107
Coupling, shaft.....190, 240, 241
Coupling, thill.....136, 204
Couplings, hammer for bending....24
Cows while milked, confining.....359
Cradle and chair.....40, 104
Cranberry gatherer.....378
Cream crackers.....273
Cream from whey.....238
Cream, machine for straining.....156
Crib and chair.....308
Crib for children.....429
Crimping machine.....72
Croquet board.....341
Cross head for blowers.....90
Crucible, making.....395
Crucibott es, manufacture of.....58
Crumb remover.....394
Crushing, rolling, and kneading machine.....120
Crutch.....155
Cultivator..24, 40, 41, 42, 43, 56 (2), 58 (4), 72, 88, 139, 170, 172, 173, 188 (2), 189 (3), 190, 204 (5), 205, 222, 224, 225, 254 (3), 256, 272, 289, 307 (2), 325, 326 340, 341, 342, 343, 359, 360, 361, 411, 430, 431
Cultivator and ditcher.....289
Cultivator and hoe, horse.....326
Cultivator, corn.....172, 190, 223, 274
Cultivator, cotton.....8, 325
Cultivator, garden.....289
Cultivator, plow.....123, 206, 307
Cultivator, rotary.....240
Cultivator teeth, attaching to the frames.....257
Cultivators, coupling for.....362
Cupboard, portable.....344
Curing hemp, flax, etc.....342
Currycomb.....309, 393
Curtain eyelet.....327


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Curtain fixture 40, 90, 124, 136, 307, 395, 430
Cushion and mattress 392
Cushions of car seats, redyeing 104
Cutlery 42, 394
Cutter for dovetailing machines 9
Cutter for wood-planing machines 73
Cutting board 171
Cutting machine, rotary 428
Cutting oval holes in boiler heads 171 (2)
Cutting rubber into threads 208
Cutting standing corn stalks, machine for 188, 205
Cutter thill, shifting 241
Cylinder for wool-burring and carding machines 41
Cylinder, expanding 412

D

Dam and levee 204
Damper stovepipe 411
Darning last 288
Dental anæsthetic instrument 359
Dental drill 273
Dental mallets 224
Dental mold 189
Dentists, lamp stove for 289
Dentists' tooth plugger 289, 326, 377
Dentists' vulcanizer 122
Derrick for raising sunken vessels 138
Diamond holder 57
Dice box 430
Die apparatus, rolling 343
Die, clay-pipe 290
Die for beads on sheet-metal vessels etc. 27, 59, 89, 90 (2), 120, 158, 190, 256, 376, 394
Dirk knife, spring 205
Dish washer 291
Dishes, drying 308
Disinfectant 108, 138, 172, 224
Disinfecting, apparatus for cooling and 412
Distillation 324
Distilling apparatus 289
Distributing table 379
Ditching machine 59, 124, 188, 191, 255, 289, 290, 307, 310, 394
Documents, holding and filing 122
Door and gate spring 255
Door bell and burglar alarm 24, 377
Door bolt 139, 173
Door fastener 341, 342, 360
Door fastening, portable 8
Door guard 291
Door key fastener 42
Door knobs fastened to shanks 360
Door latch 341
Door spring 139, 388
Doors and shutters 359
Doors, closing 342, 361
Doors, hanging 289
Double-cylindrical structures 170
Dough kneader 11, 42, 123, 272, 274
Dough molder 205
Draft attachment 40
Drains, suppressing effluvia from 152
Draft cock for soda-water apparatus 104
Drag for vessels 414
Drawbridges, hydraulic spindle, etc., for 25
Dredging machine 122, 123, 204
Dress elevator 25 171, 206
Dresses, cutting 72, 192
Dresses, measuring and fitting 140
Drill and blacksmith's tongs 10
Drills 360
Drills, feed motion for 398
Drills, twist, tool for cutting 41
Drilling and quarrying stone, etc 255
Drilling attachment for turning lathes 171
Drilling machine 10, 27, 123, 191, 224, 410
Driving-rein holder 191
Drop doors in coal cars, fastening, etc 428
Drop hammer 40
Drop press 290
Drug crusher, portable 136
Dry dock 172
Dry-dock indicator 104
Drying apparatus 106
Drying house 137, 188
Dumb waiter 206
Dumping car 88, 105
Dumping car for coal mines 105
Dumping wagon 430
Dust brush and broom 40
Dust pan 289

E

Eavestrough 8, 191
Eavestroughs, holding while soldering 139
Eavestrough, manufacturing 173
Effervescing fluids removed from bottles 140
Egg beater 23, 24 (2), 72, 107, 224, 288 (2), 290
Egg beater and liquor mixer 173
Egg tester 154
Electric telegraph, signal code for 258
Electro-magnets, induction coils for 255
Elevator 74, 275, 430 (2)
Elevator bucket 72, 272
Elevator guide 430
Embossing machine 410
Engine, electro-magnetic 292
Engine, hot-air 8, 28
Engine, hydraulic 48, 152, 171
Engine, rotary 290, 291
Engine, trunk 123, 138
Enve ope 378
Envelope machine 59, 178, 240
Envelope, metallic seal 27
Eraser 73, 123
Eraser and burnisher 152, 274
Eraser and pencil sharpener 258
Eraser holder 154
Escapement, clock 153, 361
Escapement, watch 153, 361
Etching grounds, producing 174
Evaporating and distilling liquids 72
Evaporator 42, 74, 89, 152, 153, 170, 171, 206 (2), 239, 240, 272, 274
Evaporator, sorghum 139, 238
Evener for poles to wagons 191
Excavator 57, 124, 173, 413
Explosive compound 138
Explosive liquids used for light and heat 139
Extinguisher for lamps 40, 358, 360
Extract of hops, producing 27
Extracts, making 139, 327
Eye glass 122
Eye glass suspender 290
Eye piece for microscopes, binocular 43
Eye water 26
Eyeleting machine 121, 156, 398

F

Fan 289
Fan blower 306
Fan, lady's 140, 173
Fans, circular paper, binding 377
Fanning mill 11, 121, 170
Fare box 123
Fastening, metallic band 272
Fat, lard, etc., machine for cutting 137
Faucet 48, 139, 191, 265, 241, 272, 309, 342, 361, 377 (2), 392, 395, 412
Faucet, basin 137
Faucet, beer 72
Faucet, diaphragm 340
Faucet, measuring 60, 272, 396
Feed bag 11
Feed box, ration 89
Feed cutter 306, 307
Feed cutter and box 273
Feeding trough 56, 170
Fence 26 (2), 74, (2), 105, 106, 121, 123, 136, 154 (2,) 172, 189, 205, 207, 208, 225, 240 (2), 255, 290, 324 (2), 342, 379, 394, 410, 411, 414, 429
Fence, field etc 105, 136, 190, 288, 307, 342, 139
Fence, portable 27, 104, 188, 309, 324
Fertilizer 25
Fibrous materials, picking and opening 275
Fibrous material, sizing 411
Fibrous substances reduced to a pulp 122
File 208
File blanks, machine for roling 359
File-cutting machine 188
Files, apparatus for stripping 205
File, repairing 105
Filing machine 376
Filter 56, 290, 343, 414
Filter and cooler 257
Filter press 140
Finger, scarf, and napkin rings 90
Fire alarm 27, 341, 359
Fire and burglar alarm 274
Fire-arm, adjustable stock of 75
Fire-arm, breech-loading 8, 11 (2), 73, 91, 10, 120, 140, 255, 257, 343, 358 362 (2), 396
Fire-arm, double-barreled 309
Fire-arm, magazine 122, 174, 191, 275 (2), 288, 291, 309
Fire-arm, revolving 11, 74, 156, 173, 204, 360
Fire-arms, fitting lock plate to stock of 411
Fire-arm, telegraphic 205
Fire-arms, many-barreled 222
Fire escape 73
Fire, extinguishing 324, 378
Fire, kindling 107, 190
Fireplace 343, 360, 412
Fireplaces, adjustable damper for 377
Fire shield 429
Fire tester, carbon-oil 43
Fish, extracting oil from 155
Fishhook 255, 379
Fishhook, spring 378
Fish to pass over dams 27
Fishing apparatus 121
Fishing-line reel 121
Fishing-line sinker 107, 238
Fishing lines, etc., making 309
Fishing net 8, 342
Fishing reel 9
Fishing rods 289
Fishway 138
Flange 59
Flange for privy bowls 411
Flask for casting steel ingots 72
Flatiron 224
Flax and straw breaker, cleaner, etc 343
Flax breaker and cleaner 343
Flax gathering and loading 411
Flax straightener and thrasher 343
Flax thrasher 340
Flood gate 122
Flood gates, self-operating 204
Floor covering 190, 224
Floor covering, manufacture of 257
Flour bolt 120, 395
Flour packer 26, 90, 240, 378
Flour sifter 59, 327
Flour sifter, mixer, and kneader 340
Flue cleaner, revolving 410
Flute, etc 208
Fluting machine 154, 379
Fly fan 274
Fly flaps 154
Fly nets, machine for cutting 25
Fly wheel and crank shaft 307
Flyers for roving frames 206
Fog signal 359
Foot warmer 341, 394
Foot warmer and reflecting lamp 256
Forging apparatus 392
Forks, machine for making 122
Foundery venting core 361
Freight, receiving and discharging 191
Fruit and vegetables, preserving 341
Fruit basket 25, 123, 326
Fruit box 8, 10, 291, 292
Fruit can 72, 309
Fruit cans, expanding frames for soldering 88
Fruit cans, fastening for 27
Fruit cans, sealing 377
Fruit cans, tin, mode of making 25
Fruit cans, top for 257
Fruit dryer 122 205, 377
Fruit gatherer 122, 123, 170, 188, 189, 190 (2), 413
Fruit jar 57, 105, 121, 225, 274, 362
Fruit picker 136, 172, 189, 361
Fruit press 395
Fuel dumper 239
Fuel, manufacture of 189, 205, 377, 413
Fulminating composition 56
Fumigator 307
Funnel 153
Funnel, measuring 104, 171, 307
Furnace, etc 73, 88, 89, 104 (2), 105, 107, 121, 123 (3), 138, 189, 205, 222, 241, 254, 258, 274, 289, 290, 291, 325, 326, 327, 361, 412 (2), 414, 430
Furniture, composition for 414
Furniture knobs, fastening for 325
Furniture pad 341
Furrower for corn ground 291

G

Gege cock, boiler 258
Gage for determining angles 362
Gage for screw-cutting tools 206
Gage, surface and depth 411
Gaiter boot 341
Galley, printer's 411
Galloon trimming 272 (2)
Galvanic battery 188
Garbage box 27
Garden rake 136
Garter 88
Gas apparatus, etc. 9 (3), 12, 26 40, 41, 43, 57 (2), 75, 91, 107, 123 (2), 138, 140, 155, 170, 171, 172, 188, 189, 190 (2), 191, 207, 238, 240, 258, 272, 275, 288 (2), 292, 307 (2), 344, 362, 376, 393, 411, 430
Gases, carbureting and enriching 222
Gases—preventing their escape from soap kettles, etc 326
Gases produced from petroleum and water 43
Gasalier and cigar lighter 360
Gate 40, 41, 56, 73 (2), 104, 155, 189, 190, 207, 224, 238, 272, 306, 307, 308 (2), 324, 341 (2), 342, 376, 380, 411, 430
Gate and gate post 376
Gate, automatic 8, 27, 123
Gate, farm 26, 88, 171, 189, 206, 306, 360, 378, 430
Gate fastening 223, 239
Gate, fence 26, 254, 343
Gate, ferry bridge 8
Gate for forebays 26
Gate hinge 291, 324, 325
Gate latch 137
Gage cock 9
Gage for boilers 9
Gage, paper, for printing presses 43
Gage, steam 42, 43, 104
Gear cutter 43, 75
Gearing, intermittent and expansive 308
Gib for cross-head 40
Glass bottles, construction of 327
Glass, ornamenting and lettering 255
Glass, process of manufacture 410
Glass press 152
Globe 288
Globe cock 12
Glue, liquid 91, 327
Gold and silver ores, desulphurizing 41
Gold and silver separated from ores 392
Gold-beating apparatus 154
Gold for dentists, preparing 105
Gold separator 90
Gold with mercury, amalgamating 223
Gong bell 272
Goniometer 40
Governor 121, 341 (2), 342 (2), 411
Governor for horse-power 206
Governor, hydraulic 173
Governor, vibrating 378
Grab tool for oil wells 122
Grading instrument 428
Grain, apparatus for weighing 10
Grain cars, etc 43, 59, 156, 172, 222, 258, 291, 325, 378, 393, 395, 412, 414, 428
Grain separator 24, 27, 56 (2), 57, 59, 222, 274
Grain-tallying machine 325
Granite, machine for cutting 290
Grape trellis 88
Grape-vine protector 396
Grape vines, training 190
Grappling irons 170, 429
Grate 154
Grate and andiron, portable 393
Grate bar 8, 153, 155, 239, 256 (2), 327, 410
Grate for heating stoves 308, 428
Grate, water 309
Grater and egg beater 24
Grater for carrots and other vegetables 139
Grater, nutmeg 326
Grinding and polishing, composition for 121
Grinding cutlery, etc., machine for 73
Grinding mill 12, 25, 57, 91, 188, 190, 275, 305, 342, 311, 391, 396, 436
Grinding tools, etc., machine for 172
Grindstone journal box 288
Grindstone, tool rest for 257
Grooving lumber, machine for 170
Ground drag 206
Ground roller 190
Grubbing machine 136, 173
Guard attachment for cultivators 190
Gun barrel 204
Gun barrels, heating and soldering 8
Gun cotton, manufacture of 379
Gun lock 207, 250
Gunpowder 12
Gunpowder, manufacture of 272
Gun stock 11
Gun swab 89
Gutter, iron 377

H

Hair crimper 155
Hair, iron for curling 153
Hair restorative 274
Halter 326
Hame fastener 90, 428
Hames tug 205, 206 394
Hammer, bush 343
Hammer for forging blooms 342
Hammer, nail 56
Hammers and stamps, operating 12
Hand cuff 74
Hand press, rock motion for 414
Hand truck 170
Handle for brush 188
Handle for coal shovel 190
Handle for cutlery 171
Handle for sandiron 222, 240
Handle for stoves 239
Handles attached to boilers, etc 428
Harmonium 140
Harness 58, 74, 137, 327
Harness bell 58
Harness hook 27
Harness, saf ty line for 413
Harness saddle 41, 411
Harness reins 377
Harrow 42, 56, 138, 204
Harrow and marker 206
Harrow, carriage 290
Harrow, rotating 225
Harvester 12 (4), 24, 59, 72, 73, 104, 123, 136, 155, 172, 173, 273, 275, 287 (2) 430
Harvester, corn 25, 57, 137, 153, 154, 224, 240, 241 (2), 274, 414
Harvester cutter 123, 137
Harvester-cutter harpener 89
Harvester, husker and sheller, corn 288
Harvester rake 26, 88, 104, 429
Harvester sickle head 105
Harvester sickles, sharpening 376
Harvesters, etc., tempering knife sections for 174
Hat 74, 123, 172, 240 (2)
Hat-blocking machine 362
Hat bodies, dyeing 272
Hat bodies, felting 307, 376 413 (2)
Hat box and valise 288
Hat brim spring 412, 413
Hat-finishing press 257
Hat presser 155, 174, 258, 395
Hat protector 136, 307
Hat rack 89
Hat rack and seat 136
Hats and bonnets, fabric for 377
Hats, loom for weaving 340
Hats, machine for pouncing 223
Hats, making 254
Hats, sewing sweat linings into 273
Hay elevator and conveyor 307
Hay and grain protector 254
Hay and straw knife 239
Hay derrick 378
Hay elevator 239, 258, 359
Hay fork 359, 395
Hay fork, horse, 24, 26, 56, 72 (2), 73, 74, 105, 107, 121, 137 (2), 138 (2), 153, 173, 190, 223, 273, 307, 310, 358, 360, 378
Hay knife 12
Hay loader 41, 121
Hay-loading wagon 170
Hay press 139, 153
Hay rack for wagons 24, 224, 239, 411, 413
Hay rake 40, 189, 290
Hay raker and loader 40, 59, 155, 239, 272, 289, 309 (2), 324
Hay spreader 307
Hay stacker 58, 171
Head block for saw mills 43, 121, 138 430
Head dress for ladies 153
Head light, engine 26
Head rest for railway cars 206
Heads of casks, machine for holding 171
Hearse 289
Heat radiator 170
Heat radiator attached to stove-pipes 393
Heater for soldering irons 377
Heater, portable 341
Heater, steam-generating 410
Heating apparatus 106, 412
Heating stove 11, 40
Hedge trimmer 173
Heel iron 274
Hemming guide for sewing machine 288
Hemp, flax, etc., treating 411
Hemp and cotton stalk puller 429
Hides and skin, curing 325
Hides and skins, fleshing and stoning 361
Hides, apparatus for working 104, 343
Hides, skins, furs, etc., preparing for use 11
Hides softening dry 360
Hinge 309
Hinge, carriage 40
Hinges, machine for making 12
Hitching device 88, 326
Hoe 137, 306, 412
Hoe and corn planter 8
Hoes, manufacture of 376
Hog cholera, medicine for, 42, 254, 290, 392
Hog trough 190
Hogs, machine for scalding 308
Hogs prevented from rooting 42
Hoisting apparatus 122, 171, 204, 223, 241, 309, 379
Hoisting jack 395
Hoisting power, treadwheel 377
Hold back for carriages 343
Hominy machine 154, 429
Hook and eye 394
Hook for davit-fall block 224
Hoop lock 288
Hoop skirt, 12, 40, 88, 106 (2), 138, 153 273
Hoop skirt, clasp for 257
Hoop-skirt machine 394
Hoop-skirt supporter 136
Hoop-skirt wire 362
Hoop skirts, frame for forming 292
Hoops for casks, machine for shaving 190
Hop-vine support 154
Hops, curing 394
Hops, training 324, 414
Horse collar 170, 273, 360, 396
Horse collars, filling 362
Horse collars, stretching 362
Horse hoe 89, 359
Horse holder 362
Horse netting 121
Horse power 72, 207, 411
Horse-power brake 258
Horse-power elevator for hay, etc. 173
Horse rake, 9, 24, 27, 56, 57 (2), 88, 122 (2), 170 (2), 171, 222 (2), 255, 274, 289, 309, 361, 413
Horseshoe, 42, 43, 56, 59 (4), 73, 74 (3,) 120, 123, 124, 139, 153, 155 (2), 241, 256, 272, 307, 362
Horseshoe bender 174
Horseshoe calk 139
Horseshoe calks, sharpening 8
Horseshoe machine 8, 58, 343
Horseshoe nail machine 26, 257, 327
Horseshoe nails, forging 256
Horseshoes, blanks for 376
Horses, hitching 361
Horse carrier 205
Hose coupling 57, 59, 290
Hose nozzle, revolving 58
Hose-pipe nozzle 394
Hose, water-proof, manufacture of 254
Hosiery ironing machine 170
Houses, construction of 380
Hub 273
Hub, metallic 204
Hydrant 11 (2), 12, 26, 121, 156, 361 (2), 412 430
Hydrocarbon liquids transmitting heat 288
Hydrometer 291

I

Ice and coal box 155
Ice breaker 222
Ice cream freezer 24, 28, 341
Illuminating apparatus 56
Impregnating substances with preservative material 208
Inclined plane, winding apparatus for 155
India-rubber, etc., manufacture of 291
Indicator for vessels, leeway 40
Inhaler 341
Innit al studs, manufacture of 106
Injector 124, 359
Ink cup 325
Ink—removing it from type 254
Ink—well cover 292
Inkstand and calendar 90
Inkstand, sandbox, etc 42
Insects, destroying 255, 393
Instrument for imitating the skin 12
Iron and steel direct from the ore 393
Iron and steel, manufacturing bars of 360
Iron and steel, uniting 91
Iron and steel, welding 430
Iron, hardening 88
Iron, sheet and bar, manufacture of 105
Ironing board 138
Ivory-keyboard smoother 107

J

Jack, carriage 88
Jack for congress gaiter 152
Japanned leather, substitute for 153
Jar, making ring 324
Jewelry, setting stones in 257
Joints for frames and legs of tables 123
Joints, making rule 378
Journal box 223, 153
Journal box, anti-friction 223
Journal boxes, lining for 359
Journal boxes, lubricating 90
Journals, oiling 27

K

Key board 341
Key fastener 121
Key seats, machinery for cutting 222
Kiln, grain-drying 309
Kingbolt for carriage 360
Knapsack 394
Knife 123
Knife and fork 188, 206
Knife and fork, manufacture of 239 (2)
Knife and scissors sharpener, 25, 90, 172
Knife carrier 306
Knife cleaner 84 204
Knife for removing hair from hides 43
Knife scourer 89
Knife sharpener 58, 191
Knives to handles, attaching 188
Knitting machine 11, 28, 273, 379
Knitting-machine needles 88
Knob latch 206
Knob hole for carriage curtains 362
Knuckle joint 430

L

Ladder 288, 306
Ladder, extension 327, 361
Ladder hook 275
Ladies' dresses, obtaining measures for 394
Lagerbeer, manufacture of 74
Lamp, 12, 24, 75, 122, 136, 173 (2), 241, 256 (2), 395, 430
Lamp and blow-pipe, soldering 41
Lamp and candle stand and holder 123
Lamp bracket 72, 395
Lamp burner 412
Lamp chimney 122, 123, 341
Lamp chimney and shade 40
Lamp-chimney attachment 291
Lamp-chimney cleaner, 42, 137, 170, 239, 377
Lamp cleaner 25
Lamp, etc., suspender 361
Lamp extinguisher 105, 190
Lamp, fountain 152
Lamp, ard 139
Lamp, locomotive 26
Lamp shade 90, 359
Lamp-shade supporter 40
Lamp, street 10
Lamp ventilator and shade 106
Lamp wick 11, 325, 378
Lamp-wick regulator 58
Lamps, attaching burners to 105
Lamps, ratchet-wheel fixture for 43
Lan e, spring 8
Lant rn, 25, 88, 89, 90, 138, 206, 207, 223, 239, 254, 292, 362 (2), 378, 410 (3) 131
Lantern and foot warmer 377
Lantern, street 137, 429
Lap joint for belting 207
Lap skiver 257
Lard boiler 340
Lard, cooling 191
Larder, ventilated 147
Last 89, 120, 325, 340
Latch fastening 137
Latch, stop-mortise 308
Lathe clutch 410
Lathe dog 413
Lathe dog-carrier 431
Lathe for cutting screws 60
Lathe for pen handles 341
Lathe for shafting 272
Lathes, turning 189, 411
Lathe for whip stocks 73
Lathe rest for turning balls 11
Lathe, rose engine 138
Lathe, watchmaker's 190
Lathe, wood-turning 288, 292, 414
Lathes, feed stop for 56
Lead obtained from dross 308
Leather, cement for 376
Leather-chamfering machine 121
Leather, clamping and stretching 154
Leather cloth, manufacture of 344
Leather, creasing 289
Leather creasing and skiving 306
Leather, machine for cutting 240
Leather, machine for dressing 411
Leather, manufacturing japanned 275
Leather, piercing 190, 288
Leather rendered more durable and flexible 362
Leather, rolling 413
Leather, rubber-coated 341
Leather, splitting and skiving 274
Leather, stretching 326
Leather strip 41
Leather, stuffing and currying 138
Lenses, fluid 173 396
Let-off for braiding machines 136
Letter-box file 356
Letter box, postal 8
Letter file 152
Letters, etc., receiving and delivering 368
Level 289
Lice on trees, destroying 90
Lid supporter 291
Light, producing 59
Lightning rod 254
Life boat 107, 123, 174
Life raft 56
Lifting bar 8
Lifting jack 48, 155, 191
Lime kiln 10, 376
Liquid cooler 28, 122, 361
Liquid measurer 136, 376 428
Liquor, ripening 123
Liquors, extracting specimens of 89
Lock, 8, 24, 73, 106, 155, 171, 172, 189, 204, 274, 291, 308, 360 (2), 413
Lock, alarm 222
Lock for doors of baggage cars 207
Lock for mail bags and carpet sacks 42
Lock for throttle valves 90
Lock for trunks 258
Lock joints formed in sheet metal 207
Lock keeper, adjustable 106
Locks attached to safes, vaults, etc 398
Locomotive 228
Locomotive engine 340
Locomotive fire grate 327
Locomotive head lights 360
Locomotive, smoke stack for 324
Loom 74, 121, 155, 189, 208, 273, 393, 396
Loom for weaving cloth with swells 138
Loom, hand 139, 290, 309, 414
Loom, let-off 307
Loom let-off and take-up 255
Loom, narrow-ware 256, 360 429
Loom, power 189
Loom take-up, narrow-ware 275
Loom, temple for 174
Looms for weaving at blind 75, 205
Looms, harness motion for, 42, 122, 393
Looms, operating the harness of 306
Looms, stop motion for 392
Lounge 106
Lounge, folding 430
Low water detector 40, 359
Lozenge 393
Lubricating brush 188
Lubricating carriage axles, journals, etc 394
Lubricating cup for steam engines 241
Lubricating, material for 208
Lubricating oil 189
Lubricator 59, 138, 241, 255, 288, 413
Lumber drying 393, 394

M

Machine for pressing and molding pliable materials 9
Magno-electric apparatus 223, 362
Mail bag, water-proof 325
Mail bags on railway cars, receiving and delivering 206
Malt, conden ed extract of 429
Malt kiln 359
Malt-kiln floor 207
Malt-liquor cooler 340
Maltshovel 136
Mandrel, adjustable 10
Mandrel, expanding 392
Manger 239
Map, geographical 288
Maps, constructing blocks for printing 124
Marble, ornamenting 393
Marble-polishing machine 290, 379
Marine compass 24
Mariner's compass scale 207
Match safe 239, 257
Match-safe, pocket 378
Mash machine 428
Matches, machine for framing 24
Mattress, spring 139


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Measure, adjustable..... 289
Measure, variable..... 324
Measuring distances, instrument for..... 289
Measuring funnel.....27, 359
Meat and vegetable cutter..... 59
Meat cutter for sausages..... 138
Meat, etc., smoke furnace for curing..... 377
Meat mangler..... 207
Meat, preserving.....257, 325
Mechanical movement.....72, 240
Medical compound, 11, 26, 42, 88, 205, 239, 376 (3), 377
Medical compound for foot-rot in sheep..... 378
Medicated gas..... 324
Medicated troches..... 394
Medicator, mechanical..... 240
Medicine.....138, 153, 172, 228, 273, 308 (2)
Medicine chest..... 308
Medicine for horses..... 325
Melodeon.....170, 309
Metal plates, grinding..... 411
Metals separated from ores, 289, 344 (2)
Metals, composition for polishing.. 413
Metal tubes, making..... 43
Metals, compressing and extending 106
Metallic bindings..... 379
Metallic characters on paper, etc., forming..... 10
Metallic oxides, reducing.....10, 209
Metallic rods, upsetting and forming articles from..... 342
Meter, liquid and spirit..... 44
Microscope..... 56
Milk and cheese rack..... 104
Milk can.....12, 238
Milk, cooling..... 105
Milk pail..... 8
Milk, preserving.....189, 411
Milk rack..... 41
Milk strainer..... 379
Millstones, hanging..... 324
Millstones, picking..... 411
Miner's fuse lock..... 273
Mineral water, preventing sediment in..... 342
Mirror..... 104
Mirror, hanging..... 9
Mirrors, metallizing..... 362
Miter box.....153, 308
Mitering machine..... 153
Mold for plastic..... 414
Mold board for plow..... 170
Molds, facing..... 106
Molds, jointed..... 190
Molder's clamp..... 395
Molder's flask.....205, 224
Molder's flasks, hinge for..... 292
Molder's match plates, composition for..... 56
Molding..... 191
Molding cohesive materials..... 75
Molding, machine for making ..... 272
Moldings, ornamenting.....377, 411
Moldings, plaining..... 24
Money drawer..... 256
Mop and scrubber..... 189
Mop head.....28, 274, 289, 327
Mop holder..... 290
Mop dish..... 429
Mop wringer.....359, 396
Mortar mill..... 395
Mortising machine.....106, 290
Mosquito bar.....43, 123
Mosquito canopies, frame for..... 239
Motion, communicating..... 410
Motion, reciprocating converted into rotary..... 138
Motion, transmitting.....56, 188, 308
Moving machine.....9, 26, 42
Mules, self-acting..... 106
Musical instrument.....43, 204, 208
Musical instrument, keyed..... 292

N

Nail and tack..... 43
Nail hammers..... 107
Nail machine.....224, 273, 395
Nail, picture..... 27
Nail-plate feeder.....11 (2)
Nails and tacks, making..... 272
Nails, drawing..... 361
Nails, harness, manufacturing ..... 90
Necktie.....58, 190, 224
Necktie, collar and bosom..... 258
Necktie fastening.....25, 56, 255
Necktie, india-rubber..... 241
Necktie supporter.....124, 137, 188
Neck yoke..... 155
Needle case..... 362
Needle for caning chairs ..... 73
Needle for sewing machines..... 27
Needle threader ..... 240
Needle wrapper..... 308
Nitroleum and nitro-glycerin packing..... 90
Numbering machine..... 361
Nut..... 43
Nut tapping machine.....28, 42
Nuts and washers, making ..... 124
Nuts, machine for making..... ...42, 225
Nut box, adjustable..... 362
Nutmeg grater..... 273

O

Oar swivel..... 254
Observatory ..... 274
Oil, apparatus for distilling.....153, 238
Oil barrels, lining for..... 153
Oil, burning it for fuel..... 254
Oil can.....40, 308, 430 (2)
Oil can and oiler.....224, 410
Oil cup..... 393
Oil injector for steam engines..... 136
Oil, obtaining it from wells.....128, 377
Oil refining.....43, 411
Oil tank ..... 273
Oil well..... 411
Oil-well boring and pumping apparatus..... 240
Oil-well drill..... 289
Oil-well packing..... 327
Oil-well tube..... 57
Oil-well tubing, stop water for..... 289
Oil wells, increasing capacity of... 380
Oil wells, pipe for.....273, 275
Oil wells, removing obstructions from..... 207
Oils, treating.....376, 395
Oiler.....40, 57, 223
Oilers, attaching tubes to..... 56
Oiling and rotating around shafts. 430
Ordnance..... 8
Ordnance and fire-arm..... 173
Ordnance, breech-loading..... 12
Ordnance, operating.....41, 73, 188
Ordnance, revolving..... 190
Ore or quartz crusher ..223 (2), 361, 411
Ore washer..... 291
Ores and minerals, obtaining metals, etc., from..... 361
Ores, desulphurizing...138, 152. 223, 410
Ores of copper, sulphurous, treating..... 361
Ores, metalliferous, treating..... 154
Ores, reducing..... 154
Ores, roasting, desulphurizing, and smelting..... 208
Ores, separating metals from..... 376
Ores, table for concentrating..... 395
Ores, treating..... ..24, 72
Ores, treating with chlorine..... 88
Organ reed..... 188
Oven.....254, 257
Oxide of lead, reducing..... 90
Oyster dredging apparatus..... 377
Oyster rake..... 255
Oysters, preserving..... 378

P

Package case for plants..... 58
Packing for deep well tube..... 256
Packing for steam engine, fibrous 41
Packing revolving joints..... 429
Pad hook..... 241
Paddle wheel....12, 104, 107, 122, 205, 272, 428
Paddle wheels, driving..... 43
Padlock..... 74 (2), 90 (2), 239, 431
Paint.....59, 106, 289
Paint brush.....105, 378
Paint, composition for.....255, 359
Paint for ship's bottom..... 256
Pantaloon protector ..... 57
Paper boxes, cutter for..... 225
Paper boxes, making..... 392
Paper, etc.....10, 24 (2), 89, 91, 105, 106, 107 (3), 138, 153 (2), 222, 238, 254, 256, 273, 274 (3), 289, 292, 307, 209, 326, 341, 342, 361 (2), 378, 392
Parasol, feather-covered..... 104
Paring knife..... 57
Paris white and whiting..... 410
Paste, prepared..... 256
Pastry roller..... 379
Patterns, puncturing machines for making..... 25
Pavement.....59, 89
Pavement, Belgian..... 255
Pavement, etc, composition for ..... 275, 341
Pea sheller.....72, 240
Peg holders..... 106
Pegging machine..... 379
Peat, drying.....170, 225, 379, 429
Peat, grinding..... 430
Peat for fuel, preparing.....170, 257
Peat machine.....57, 90, 225, 379, 429
Pen and eraser..... 74
Pen, fountain.....138, 275
Pen holder.....40, 121 272
Pen rack and bill holder..... 275
Pen rack, spring..... 254
Pen, writing..... 90
Pencil case..... 38
Pencil holder.....58, 223
Pencil, indelible..... 56
Pencil scale..... 414
Pendulum, clock..... 414
Pepper cast r..... 240
Percolator and filterer..... 430
Percussion-cap trimmer..... 75
Pessary.....11, 359, 393, 414
Petroleum, car for transporting .24 (39)
Petroleum cooker and h ater ..... 239
Petroleum, distilling ..58, 107, 233, 327
Petroleum, double s ill for..... 257
Petroleum, etc., distilling 25, 56, 207, 208, 414, 429
Petroleum, etc., purifying..... 56
Petroleum, manufacturing gas from..... 107
Petroleum, packing vessel for..... 239
Petroleum, still for..... 327
Petroleum, etc., storing..... 256
Petroleum tank.....28, 170, 204, 208
Petroleum, treating..... 152
Photograph finishing roller..... 344
Photographs, drying..... 207
Photographs, tinting..... 121
Photographic album..... 327
Photographic apparatus..... 10
Photographic printing frame...136, 377
Photographic process..... 344
Photometer..... 13
Piano.....138, 140, 172, 291, 292, 360
Piano, couch, and bureau..... 75
Piano, double-action..... 155
Piano-forte action.....310, 326
Piano-forte covers, etc., ornamenting..... 352
Piano-fortes, augmenting sound in 159
Piano sounding board.....283, 308
Piano stool.....306, 326
Pianos, metal frame for..... 189
Pick and ax..... 255
Picker arm for looms..... 28
Picker motion for power looms.... 121
Picker for fibrous material..... 137
Picture frame.....89 362
Picture nails..... 341
Pictures, attaching to frames..... 378
Pie rimmer..... 207
Pigment, manufacture of..... 140
Pile driver..... 343
Pliers, protecting..... 10
Pins, for wearing apparel..... 307, 430
Pipe coupling.....393, 411
Pipe joints, etc., forging..... 292
Pipe, smoking.....324, 414
Pipe tongs.....171, 359
Pipes, mash-tub, preventing coating of..... 170
Piston for deep-well pumps.....73, 204
Piston for steam engine, 73, 121, 174 191
Piston packing, 91, 104, 138, 139, 154, 206, 224, 288, 308, 310, 379 (2), 395, 429
Piston packing rings.....124, 138
Pitcher..... 123
Pitcher, molasses..... 123
Pitman box..... 136
Pitman, connection..... 327
Pitman, etc., hanging..... 152
Pitman harvester.....137, 324
Pitman head, etc., for harvester.. 59
Pitman for presses, punches, etc... 90
Plane, core box..... 412
Plane, edge..... 223
Plane, miter..... 413
Planing and sawing machine, dust and shaving conveyer for..... 256
Planing machine...11, 58, 88, 91, 138, 393
Planing machines, feed roller for.. 344
Plants, transplanting..... 288
Planter.....222, 256, 308
Planting-ground marker..... 122
Plaster..... 72
Plaster, etc., machine for sowing.. 327
Plate for artificial teeth..... 189
Plate, hollow pressure..... 362
Plow 10, 40 (2), 59, 72, 89, 106, 120, 137, 138, 153, 189, 190 (2), 205, 207 (2), 223, 224, 240 (2), 254, 255, 257 (2), 290, 291, 306, 307 (2), 308, 326, 342, 343, 344, 359, 395, 410
Plow and harrow, sulky..... 288
Plow, bog-cutting..... 359
Plow cleaner.....59, 139
Plow clevis..... 155
Plow colter..... 152
Plow, double-revolving..... 138
Plow, double shovel..... 272
Plow, furrowing..... 259
Plow, gang 9, 27, 90, 120, 122, 136, 188, 254 (2), 273, 377, 288, 358
Plow, garden..... 105
Plow handles, machine for forming 105
Plow, mold board for..... 326
Plow, mole..... 308
Plow, shovel.....8, 223, 272, 324
Plow, steam.....174 (2), 308
Plow, sulky.....91, 205, 207, 325, 341, 361
Plow, wheel..... 105
Plugs in steam generator, inserting fusible..... 22
Pocket-book protector..... 25
Pocket, seamless..... 208
Pocket tablet..... 105
Pockets, safety attachment for.... 223
Poker and tongs..... 358
Pole and post puller..... 205
Pole-iron socket for carriages..... 154
Policeman's rattle..... 395
Polishing box..... 106
Polishing enameled paper, machine for.....74, 91
Pork, curing..... 139
Post driver..... 393
Postal wrapper..... 342
Post-office delivery box..... 170
Potato digger,....58, 72, 172, 239, 240, 258 413, 428
Potato drill.....139, 254
Potato fork.....254, 308
Potato planter..... 9
Potato masher..... 429
Potato washer..... 91
Pouncing hats, machine for..... 139
Power loom, concave and convex 272
Power, manual..... 309
Power press..... 12
Power, swinging..... 378
Power transmitted by cars on rails 137
Precious metals, cleaning particles of..... 208
Preserve can..... 139
Preserving flour, grain, etc..... 254
Preserving meat, composition for. 57
Press..... 89
Press, clay and peat..... 11
Press, cooling glass..... 412
Press, embossing..... 57
Press, foot..... 361
Press for cider mill..... 106
Press for manufacturing sugar.... 57
Press, hydraulic, for peat, brick, etc 152
Press, tobacco..... 414
Press, upsetting..... 9
Presser foot for sewing machine... 123
Priming metallic cartridges..... 9
Printer's rollers, composition for 204, 359
Printing on bottles..... 89
Printing press.....104, 170, 174
Printing-press register..... 12
Printing presses, bed-recoil springs for..... 104
Printing textile fabrics, machine for..... 57
Printing yarn, machine for..... 173
Privy..... 254
Privy seats..... 310
Privy-seat cover..... 120
Projectile.....13, 283
Projectile, compound..... 205
Projectiles for rifled ordnance, packing.....12, 104
Propeller.....124, 191, 275
Propelling horse..... 428
Propeller and steerer, boat, portable..... 308
Propeller for canal boats..... 172
Propeller for spindle-shaped ships 192
Propeller for steamships.....12, 188
Propeller, hand, for small boats.... 222
Propeller screw..... 121
Protector for corners of rooms and stairs..... 106
Pruning instrument, 8, 191, 240, 274, 324, 412
Puddling furnace..... 59
Pulley.....324, 325, 378
Pulley attachment for raising weight..... 137
Pulley, cast-iron chain..... 428
Pulley, friction.....153, 413
Pulley, friction clutch..... 288
Pulleys, mold for casting..... 11
Pulley suspension hook..... 358
Pump, 24, 42, 57, 72, 74, 89, 90 (2), 91, 120, 171 (2), 173, 174, 205, 289, 306, 307, 309, 341, 358, 362, 378, 410 (2)
Pump, air-compressing..... 309
Pump and engine rotary.....429 (2)
Pump, bellows..... 396
Pump, driving ..... 256
Pump for deep wells, 8, 24, 72, 73, 136, 224
Pump piston.....59, 171, 190
Pump, railroad-station..... 74
Pump, reciprocating..... 43
Pump, etc., rotary.....107, 420, (2)
Pump, sand.....191, 256, 272
Pump, steam.....124 138
Pumps, attachment for..... 224
Pumps, etc., reciprocating motion to..... 291
Punch.....137, 342
Punch for horseshoes..... 273
Punch, gang..... 325
Punches, shears, etc., hand operating..... 105
Punching presses, rods of..... 377
Putty, composition for..... 171

Q

Quartz crusher 43 (2), 89, 105, 106, 258, 288, 324
Quartz, desulphurizing..... 155
Quartz mill.....40, 41, 73, 74, 342, 396
Quilting frame..... 56

R

Rack for hauling wood..... 223
Radiator.....238, 239
Rafting pin..... 308
Rags, etc., engine to reduce them to fiber..... 153
Railway car for preventing accidents..... 9
Railway-car window..... 275
Railway chair 3, 9, 104, 191, 206, 225, 324, 325
Railway crossing.....189, 190
Railway frog.....58, 238
Railway station indicator..... 361
Railway track clearer..... 273
Railroad.....73, 258, 273, 309
Railroad bars, joint for..... 290
Railroad car.....59, 89, 360
Railroad-car box..... 291
Railroad-car brake.....137, 412
Railroad-car roofs..... 138
Railroad-car seat.....153, 275
Railroad cars, iron..... 255
Railroad cars, machinery for unloading..... 121
Railroad cars, spring for..... 154
Railroad-chair machine..... 224
Railroad drawbridges, signal for.. 256
Railroad, portable..... 191
Railroad rail....58, 105, 124, 170, 341, 410
Railroad rails, fastening for..... 171
Rail road rails, iron and steel..... 124
Railroad signal..... 291
Railroad sweeper..... 58
Railroad switch..... 289
Railroad switch lantern..... 152
Railroad tanks, elevating water in..... 139
Railroad-ticket printing press..... 344
Railroad turnout..... 394
Railroad wedge rail..... 171
Railroads, aerial..... 206
Raisin seeder ..... 104
Rake and spade..... 308
Raking and binding attachments to reapers..... 189
Range and furnace..... 41
Rasps, machine for cutting..... 139
Raw hide prepared for various articles..... 154
Reaping machine 26, 88 (3), 172, 274, 290
Reaping and mowing machine..121, 208
Reed musical instrument..... 340
Reed plates for melodeons, etc..... 307
Reed plates, stamping..... 358
Reel.....377, 395
Reel, cord and line..... 254
Reflector for lantern, etc..... 288
Refrigerator.....9, 42, 44, 190, 414
Refrigerator building to preserve fruit, etc..... 188
Register for regulating time-keepers..... 204
Regulator for gas burners..... 136
Rein, over-check driving..... 90
Reins for horses..... 393
Rendering apparatus..... 327
Renovating faded fabrics..... 89
Rheumatism, method of curing.... 208
Retort for generating gas..... 206
Respirator..... 239
Rice cleaner..... 342
Rice, etc., hulling..... 204
Rifle box..... 222
Rigging stopper..... 12
Riveting machine..... 124
Road scraper..... 428
Robe..... 89
Rock-drilling machine.....89, 190, 392
Rocket..... 273
Rolled work while stitched, holding..... 223
Roller and corn-stalk cutter..... 25
Roller and harrow..... 273
Roller and seed planter..... 239
Roller feed for carding and picking machines..... 24
Roller for clothes wringer, etc...73 (2), 208, 290, 359, 377
Rollingappa ratus..... 123
Rollington or steel..... 154
Rolling metal, machine for.....106, 428
Rolling pin, etc..... 362
Roof of buildings.....24, 152
Roofing.....26, 105, 136, 204 239
Roofing and clapboarding..... 360
Roofing cement..41, 72, 74, 174, 224, 257, 359, 362, 394
Roofing composition..106, 153, 154, 205, 207, 224, 256, 306, 308, 340, 342, 361
Roofing, fire-proof felt..... 429
Roofing, mastic, method of spreading..... 136
Roofing material, heating and melting..... 106
Rope-driving machine..... 362
Ropes, hook and fastening for..... 379
Rotating sheep, composition for curing..... 10
Rotating-hook of W. & W's sewing machine..... 57
Row lock..... 42
Rubber articles, protecting..... 290
Rubber for dental purposes..... 291
Rubber, machine for rolling..... 378
Rubiron for carriages..... 10
Rudder ..... 326
Rudders applied to spindle-shaped hulls..... 275
Running gear of carriages..... 136
Running gear of railway cars..... 238

S

Sabot..... 12
Sack, catamenial..... 188
Saddle.....139, 228
Saddle, cart-harness..... 360
Saddle tree, lady's..... 240
Sadiron.....105, 222
Sadiron heater.....124, 240, 255, 273, 411
Safe.....74, 324, 325, 411, 430
Safe lock.....106, 124
Safes, filling for..... 88
Safety apparatus for gas machines and carburetors..... 222
Safety bridge for railroad cars..... 156
Safety cage for mines..... 121
Safety car truck..... 154
Safety paper..... 91
Safety pocket..41, 43, 58, 106, 136, 222, 342
Safety-valve tender..... 272
Safety watch pocket..... 174
Sails, reefing and furling..... 140
Salt block, apparatus for manufacturing..... 410
Saltpeter, manufacture of..... 360
Salt-water evaporating vat..... 340
Salve..... 88
Sand bellows..... 89
Sand cores for axle skeins, etc..... 378
Sand, washing..... 343
Sash fastening..40, 42, 72, 89, 90, 106, 307, 344 (2), 359
Sash lock..... 189
Sash supporter.....27, 88, 240 273
Sausage stuffer..... 12
Saw.....43, 136, 174, 240, 274, 392, 428
Saw, attaching handle to..... 289
Saw-filing machine.....224, 324
Saw for cotton gin..... 91
Saw gage, angular..... 257
Saw gummer..... 42
Saw mill.....172(2), 222, 324, 378 (2), 429
Saw set..... 124
Saw teeth, filing..... 413
Saw-toothing machine..... 139
Saws, cross-cut, securing to handles 272
Saws, sharpening..... 392
Sawing machine..11, 43, 73, 122, 124, 173, 272, 275, 291, 326, 341 (2), 393 414, 429
Sawing stone, machine for..... 173
Sawhorse..... 429
Scaffold.....73, 395
Scaffolds, holding and adjusting... 377
Scale..... 122
Scale beam..... 206
Scale for weighing ice..... 88
Scale, platform.....28, 174
Scale, weigh-lock..... 174
Scales, automatic calculator for... 153
School desk and seat.....191, 343
Scissors..... 121
Scissors sharpener..... 377
Scraper, cabinet maker's..... 91
Scraper, earth..... 190
Screen and weighing device..... 154
Screen for gas purifier..... 75
Screening and sifting apparatus... 171
Screw.....207, 306, 380
Screw blanks, griping..... 255
Screw driver..... 137
Screw eyes, inserting..... 429
Screw plate..... 91
Screw press, portable revolving... 340
Screw, wooden..... 152
Screw wrench.....11, 74
Screws, capping..... 340
Screws, lifting and pressing..... 241
Screws, machine for making..... 224
Scrubbing brush.....41, (2)
Scuttle..... 106
Scythe..... 155
Scythe stones, manufacture of..... 190
Seal fastener.....411, 412
Seal for jar and can..... 307
Seal lock..... 172
Sealing wax, preventing its adhesion to molds..... 89
Seat and desk..... 291
Seed distributor..... 173
Seed drill.....222, 309, 326
Seed planter.....42, 272, 309
Seed planter, hand.....394, 412
Seed sower, hand..... 306
Seeder and cultivator....74, 138, 289, 377
Seeding machine, 238 (2), 326, 360, 361 377, 411
Seeding machine, mode of hitching horses to..... 136
Separating crude emery from foreign substances..... 256
Separating sand from water in wells..... 207
Sewing buttons to garments..... 90
Sewing clamp..... 342
Sewing looped fabrics..... 376
Sewing machine 8, 41, 90 (2), 106, 123, 124, 138, 171, 225, 239, 254, 291, 326, 360, 393, 413, 430 (2)
Sewing-machine bobbin..... 171
Sewing machine, button-hole..10, 25 (3), 156
Sewing machine clamp..... 25
Sewing machine, fan attachment for..... 240
Sewing machine, feeding device for..... 152
Sewing-machine folder and plaiter 154
Sewing machine for boots and shoes.....104, 362
Sewing-machine gage for tucking, felling, etc..... 393
Sewing-machine guide..88, 104, 274, 249
Sewing-machine marker..... 396
Sewing-machine needle feed...121, 273
Sewing-machine needle threader.. 429
Sewing machine shuttle..225, 254, 308, 394
Sewing machine, stop device for... 121
Sewing machine, waxed thread 258, 309
Sewing machine, binder for..... 378
Sewing machine, feed motion for.. 104
Sewing machine, feeding wheel for.....25, 137
Sewing machine, loop check for... 361
Sewing-machine tension..... 431
Sewing machine, ruffling attachment for..... 254
Sewing-work holder and scissors sharpener..... 173
Shackle for carriage tongues..... 90
Shade for the eyes..... 291
Shaft for machine rubber rollers... 288
Shaft, upright, step for..... 359
Shafting, straightening..... 413
Shafting, turning.....173, 410
Shafts, attaching to sleighs and carriages..... 393
Shaking table..... 289
Shaving case, portable..... 104
Shears..... 91
Shears for cutting bolts..... 189
Shearing apparatus..... 289
Sheave, tackle block..... 42
Sheep and cattle rack..... 204
Sheep chair..... 413
Sheep holder.....56, 239
Sheep, machine for shearing...306, 309
Sheep-marking stamp..... 430
Sheep rack....26, 41, 59, 207, 222, 257, 325
Sheep rack and shed.....207 (2) 394
Sheep shears..... 274
Sheet metal, coated..... 359
Sheet-metal boxes, manufacturing 392
Sheet-metal pans, making..140, 224, 309
Sheet-metal strips, securing together..... 75
Sheets of metal, punching..... 274
Shingle machine.....10, 90, 154, 273, 291
Ship windlass..... 275
Ships, apparatus for trimming..... 191
Ships' bottoms, etc., coating..... 359
Ships, coating for..... 42
Ships, construction of.....153, 275
Shirt bosom..... 223
Shirt bosoms, fluted puffing for... 307
Shirt-collar attachment..... 90
Shirt stud..... 360
Shoe and stove brush..... 362
Shoe brush.....138, 395
Shoe cleaner..... 136
Shoe fastener with slide lacing.... 254
Shoe for car brake..... 288
Shoe-lacing fastener..... 139
Shoe for stamping machinery..... 59
Shoe nails..... 139
Shoe shanking..... 225
Shoe-string fastener..... 106
Shoe tips, securing..... 361
Shoes, water-proof..... 342
Shovel ..... 273
Shovel and tongs..... 56
Show case..... 121
Shutter fastening..... 139
Shutter hinge.....9, 341
Shuttle binder for looms..... 152
Shuttle carrier for sewing machines..... 173
Shuttle in looms, operating..... 376
Shuttle winder, tatting..... 430
Sickle sections, cutting..... 411
Side saddle..... 120
Sieve .....26, 342
Sifter.....42, 380
Sifter, meal and flour..... 104
Sign, illuminated..... 180
Signal, draw-bridge..... 75
Signal tower..... 88
Silicated liquid for soap, etc..... 240
Silk-thread twister, stretcher, etc.. 255
Sill and weather strip..... 10
Silvering mirrors..... 75
Sink, culinary..... 57
Sinking hollow piles..... 190
Siphon.....89, 240
Sirup from corn..... 8
Sirup stand and soda fountain..... 238
Skate....26, 72, 153, 173, 222, 254, 255, 377, 379 430
Skate fastening.....359, 411
Skating floor..... 379
Skeleton tumbler..... 152
Skid for supporting barrels..... 288
Skirt elevator.....60, 222, 255, 291
Skirt, lady's..... 241
Skirt springs, forming and cutting 152
Skirt supporter.....9, 257, 360
Slate cleaner..... 394
Slate frame..... 238
Slate quarrying..... 291
Slate, school and family..... 429
Sled.....153, 206
Sleeping car..... 107
Sleigh.....10, 324, 340
Sleigh brake.....206, 325, 429
Sleigh knee..... 59
Slide bolt..... 139
Slide valve..... 413
Sliding slate for computation cards 122
Slop hopper..... 189
Smoke and drying house..... 104
Smoke bells, making..... 136
Smoke house, portable metallic.... 380
Smoking pipe..... 123
Smut machine.....12, 91, 138, 343
Snaphook..9, 58, 91, 122, 138, 170, 204, 241, 344 (2)
Snow and ice guard for roofs..... 255
Snow plow.....42, 58, 188, 428
Soap..... 223
Soap, cutting and stamping..... 256
Soap, manufacture of..240, 291, 362, 394
Sod cutter..... 292
Soda fountain.....208, 254, 273
Soda water bottles, removing the wire from..... 254


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Sofa bedstead ..... 42
So ar camera, vertical ..... 342
Solar camera ..... 379
Solder-ca ting machine ..... 275
Sole, india-rubber and leather ..... 273
Sole, water-proof ..... 340
Sorgo sirup, cleansing ..... 256
Sorghum evaporator ..... 290
Sorghum mill ..... 56
Sorghum skimmer ..... 361
Sorghum stripper ..... 172, 207, 325
Sorghum stripper and cutter ..... 73, 105
Sorghum sugar manufacturing ..... 324
Sounder magnet ..... 8
Sounding apparatus ..... 73
Sounding board for pianos ..... 206
Sower and drill ..... 189
Sowing wheat and other grain ..... 204
Spade handle ..... 411
Spading machine, rotary ..... 258
Spark arrester ..... 9
Spectacle frames, manufacture of ..... 205
Spectacles ..... 393
Spec.lum ..... 275
Spice box ..... 155, 256
Spider ..... 256
Spike ..... 342
Spike drawer ..... 206, 273, 358
Spikes, ma.ing ..... 256, 257, 290
Spindle for spinning frames ..... 222
Spindl step ..... 307
Spinning direct from c rding engines ..... 309
Spinning flyer ..... 136
Spinning jack ..... 88
Spinning machine ..... 223, 393
Spinning-machine cleaner ..... 9
Spinning machine, hand ..... 89, 153, 208 (2), 412
Spinning machines, bobbin for ..... 291
Spinning machines, ring for ..... 344
Spinning mule ..... 43, 121
Spinning top ..... 9
Spinning wheel, hand ..... 325
Spirit meter ..... 223
Spirits, testing apparatus for preventing frauds in ..... 411, 414
Spirituous liquors, refining ..... 56
Spittoon for cars ..... 11, 43, 73, 326, 379
Splinter bar, three-horse ..... 308
Spoke shave ..... 8
Spokes, tenoning ..... 123, 342
Sponge cup ..... 289
Sponge for stuffing mattresses, etc. ..... 362
Spools, abeling ..... 59
Spoons, forks, etc., man facture of ..... 59
Spoons, manufacture of ..... 274
Spring acks for vehicles ..... 394
Spring bed ..... 57
Spring carriage ..... 40, 153
Spring for cars ..... 412
Spring seat ..... 56, 105
Spring, wagon ..... 43, (2)
Springs, coiling ..... 324
Springs, hardening ..... 306
Springs, india-rubber, operating ..... 174
Springs, manufacture of ..... 154, 411
Sprinkler and dredge ..... 42
Sprinkler for powdered substances ..... 341
Spruce gum, purifying ..... 152
Stack bo.tom and feed rack ..... 137
Staging ..... 272
Stair-rod fastening ..... 379
Stalk cutter, field ..... 291
Stalk puller ..... 88
Stamp canceling press ..... 75
Stamp, hand ..... 341, 343
Stamp moistener ..... 255
Stanchions for cattle ..... 324, 361
Stand and mirror ..... 189
Stand, desk, and book-holder ..... 27
Staples, wire fence, holding and driving ..... 120
Starch, size, etc., pr paring ..... 72
Stave jointer ..... 154
Stave machine ..... 10 (2), 120, 377
Stays, springs, etc., in wearing apparel ..... 73
Steam and air ejector ..... 325
Steam blower ..... 239
Steam boiler non-conducting covering ..... 340
Steam boilers, preventing incrustation of ..... 376
Steam boilers, removing incrustation from ..... 274
Steam carriage ..... 188
Steam, condensing ..... 106
Steam, decomposing ..... 325
Steam engine ..... 57, 73, 139, 154, 191, 356
Steam-engine governor ..... 122, 170, 206 256, 306, 395
Steam-engine oil cup ..... 155
Steam engine, rotary ..... 22, 238, 272, 324
Steam engine operating ..... 121
S eam engines, valve device for ..... 359
Steam generator ..... 73, 105 (2), 106, 172, 174 (2), 208 (2), 224, 258, 272, 274 (2), 275, 289, 307, 308, 310 (2), 341, 342, 377, 392 (2), 413
Steam-generator feed-water heaters ..... 172, 223
Steam-generator furnace jet ..... 308
Steam-generator indicator ..... 11, 225
Steam heating apparatus ..... 324
Steam pipe and boiler covering ..... 107
Steam propeller for boats ..... 361
Steam pump ..... 341, 344
Steam p pe ..... 429
Steam trap ..... 41, 173, 289
Steam, utilizing ..... 24
Steam water power device ..... 73
Steamer, culinary, for boilers ..... 139
Steaming vegetables ..... 172
Steel, manufacture of ..... 41
Steel, tempering ..... 153
Steering apparatus ..... 106, 288, 413, 414
Stench trap ..... 74
Stencil numbering apparatus ..... 91
Step ladder ..... 24, 122
Stereoscope, convertible ..... 122
Still ..... 395
Still apparatus, revenue fraud preventer ..... 361
Stitching clamp ..... 308
Stock, compound for feeding ..... 325
Stock yard ..... 58
Stone, artificial, manufacture of ..... 28
Stone-sawing machine ..... 376
Stone, channelling ..... 378
Stools, adjustable back for ..... 342
Stop cock ..... 10, 12, 27, 290
Stop cutters for continuous sheets ..... 258
Stop motion for braiding machines ..... 153
Stop motion for looms ..... 153
Stop motion for spinning machines ..... 238
Stop valve for steam-pipes ..... 376
Stoppings for horses' feet ..... 173
Store shelves, adjustable ..... 73
Storing hydro-carbon liquids, etc., ..... 75
Stove and drum, radiating ..... 289
Stove, base burning ..... 272
Stove, coal ..... 30, 43, 359, 375
Stove, coal oil ..... 290, 375
Stove, cooking ..... 246, 410
Stove-cover lifter ..... 26, 154, 2 , 308, 309
Stove cricket ..... 377
Stove damper ..... 11, 439
Stove door ..... 309
Stove for heating ..... 91, 122, 256, 288, 410
Stove hook, hammer, etc., combined ..... 73
Stove, vapor ..... 88
Stoves and heaters, ventilating pipe for ..... 224
Stoves, hot water reservoir for ..... 379
Stove pipe, connecting and supporting ..... 275
Stovepipe damper ..... 72, 89, 106, 120, 122, 154, 172, 238, 239, 341
Stovepipe drum ..... 27, 74, 88, 105, 172, 190, 324, 341
Stovepipe elbow ..... 430
Stovepipe, etc., adjustable shelf for ..... 275
Stovepipe top ..... 104
Strap for garments, elastic ..... 410
Strapping blocks ..... 343
Straw cutter ..... 10, 73, 105, 137, 154, 222 223, 288, 306, 342, 395
Street cars, propelling ..... 173
Street cars, starting ..... 206
Street scraper ..... 58
Street washer ..... 290
Stretcher ..... 123, 273
Stretcher for silk, etc ..... 239
Striking wo ks for clocks ..... 204
Stuffing ox ..... 378
Stump extractor ..... 24, 238, 360, 379, 429
Sugar and sirup, maple-flavored ..... 91
Sugar-cane mill ..... 205
Sugar cane, reating ..... 170
Sugar mold ..... 26
Sugar, granulating and drying ..... 223
ugar, machine for draining ..... 392
Sugar manufactured from corn ..... 289
Sugar-mold tip ..... 26
Sulky ..... 342
Sulphoacetate of alumina, manufacturing ..... 325
Sulphur duster ..... 104
Sulphur, manufacture of ..... 327
Sulphuric acid, after refining petroleum, etc., recovered and purified ..... 344
Sun, protecting animals from heat of ..... 222
Sunken vessels, raising ..... 205
Superphosphate of lime, manufacturing ..... 393
Supporters, uterine and abdominal ..... 171
Surcingle ..... 224
Surgical splint ..... 254
Suspenders ..... 155, 343
Swaging heads of screw augers ..... 108
Swaging machine ..... 12
Switch, railroad ..... 11, 27, 42, 73, 188, 189
Syringe, elastic bulb ..... 206
Syringe for sprinkling gardens ..... 105

able ..... 9, 90, 130, 306
Table and stool ..... 105
Table and bedstead ..... 428
Table, extension ..... 206, 341
Table, folding ..... 256
Table fork ..... 8
Table-leaf support ..... 25, 40, 393
Table, revolving ..... 340
Table-stand for food ..... 207
Tables, extension, slides for ..... 8
Tack extractor ..... 308
Tack hammer ..... 10
Tacks, leathering ..... 324
Tacks, capping ..... 58
Tackle block for hay elevators ..... 173
Tackle for raising and lowering boats ..... 205
Tag or label ..... 26, 361, 430
Tallow, apparatus for rendering, 136 (2)
Tally-box for measuring grain ..... 272
Tanning ..... 190, 273, 309, 324, 393, 396
Tanning, apparatus .or ..... 324
Tanning matter extracted from bark ..... 139
Taps and dies ..... 137
Tap borer ..... 428
Tea and coffee pot ..... 11, 154
Teapot ..... 72
Teeth, instrument for cutting ..... 225
Teeth, setting temple ..... 393
Telegraph cable ..... 327
Telegraph, electric ..... 120, 123, 188
Telegraph insulator ..... 88, 272
Telegraph magnet ..... 430
Telegraphic signals ..... 340
Telegraph sounder ..... 124
Telegraphs, line wire for ..... 376
Tempering springs ..... 208
Tenons, making ..... 343
Tenoning machine ..... 74, 377
Tenoning spokes, machine for ..... 189
Tether ..... 41
Thill coupling ..... 342
Thills attached to vehicles, 274, 358, 395, 414
Thrashing and hulling clover ..... 89
Thrashing machine ..... 172, 241, 326, 341
Thrashing-machine feeder ..... 359
Thrashing-machines, side gear for, 205
Throttle-valve lever ..... 205
Ticket holder ..... 360
Ticket register ..... 154
Tiles, etc., manufacturing ..... 75
Tilling the soil, machine for ..... 139
Timber, machine for tenoning ..... 360
Tin cans, opening ..... 155, 188
Tinner's solder, melting and molding ..... 255
Tinner's waste, utilizing ..... 140
Tire heater, rotary ..... 58
Tire machine ..... 58
Tire-shrinking mac ine ..... 155, 170, 308
Tire, wheel ..... 136
Tires of wheels, tightening ..... 341
Tires for wheels, measuring ..... 88
Tires, upsetting ..... 11, 223
Tobacco bag , manufacture of ..... 152
Tobacco, machine for cutting ..... 25, 307
Tobacco pipe ..... 105, 106, 154, 222
Tobacco pipe case ..... 395
Tobacco p pe cigar holder ..... 58
Tobacco pipe, stem for ..... 307
Tobacco press ..... 12, 27, 343, 376
Tobacco presser ..... 152, 191, 343, 396
Tongs and poker ..... 155
Tool ..... 56, 191, 370
Tool and rest-holder for lathes, 107, 413
Tool for adjusting lathes to turn tapering shafts ..... 56
Tool for turning or planing ..... 43
Tool handle ..... 376
Tool holder ..... 72
Tool supporter ..... 324
Top-sail reefing rig ..... 27
Torpedo ..... 380
Torpedo boat, submarine ..... 274
Toy, mechanical ..... 207
Toy sled ..... 72
Toy, spring ..... 428
Toy walking figure ..... 291
Toys ..... 224, 410
Trace connection ..... 326
Trace lock ..... 343
Trace, button and loop for ..... 328
Trap, animal, 56, 165, 170, 239, 289 (2), 376, 393, 410
Trap to remove water from steam heaters, etc ..... 328
Trapping wild fowl ..... 392
Traveling bag ..... 106, 326
Traveling-bag frame ..... 121, 155, 431
Treadle ..... 378
Tree protector ..... 12, 206, 290, 360, 393
Trestle trees for vessels ..... 105
Trunk ..... 10, 74, 75, 224, 309, 326, 414
Trunk brace and hinge ..... 104
Trunk molding ..... 342
Trunks, boxes, tc., fastening for ..... 256
Truss ..... 11, 25, 89, 107, 189
Truss bridge ..... 376
Trusspad ..... 309
T square ..... 222
Tube, grain-drill ..... 342
Tube-sheet cutter ..... 191, 429
Tube thimble ..... 121
Tubes, metal, machine for making ..... 89, 190
Tubing, etc., fabric for ..... 139
Tubing, manufacture of flexible ..... 11
Tug buckle ..... 171
Tumbler washer ..... 190
Turf, machine for cutting ..... 136
Turn table ..... 89, 153, 171
Turn table for baker's oven ..... 25
Turner and planer ..... 392
Turning lathe ..... 124, 307, 359
Tweer 42, 89, 130, 188, 223, 224, 239, 257, 428
Twine and small cord ..... 414
Twine spool and stand ..... 171
Twisting and winding fibers ..... 58
Type-dressing machine ..... 431
Type separator ..... 377
Type-setting machine ..... 124
Typography ..... 344

U

Umbrella ..... 75, 137, 153, 238, 362
Umbrella ribs, flattening and punching ..... 140
Umbrella tips, drilling, etc ..... 57
Urn cock , drop-handle, ..... 139

V

Vacuum chamber, medical ..... 341
Vacuum vessels for evaporating, e c ..... 24
Valve, automatic steam ..... 171
Va ve, balanced ..... 274, 308, 378
Valve, battle ..... 206
Valve, float, for cisterns ..... 153
Valve for hulls of vessels ..... 137
Valve for steam hammers ..... 344
Valve for water press ..... 206
Valve gear ..... 11, 222, 344
Valve gear, cut-off ..... 376, 379 (2)
Valve globe ..... 222, 257, 278, 288
Valve, governor ..... 288
Valve, governor stop ..... 56
Valve, rotary ..... 91, 340
Valve, safety ..... 9, 73, 207, 240, 257, 291, 292, 306, 309, 376
Valve, slide ..... 72 (2), 107, 172, 306, 343, 395
Valve, steam ..... 41, 122, 155, 171, 208, 289, 429
Valve, s eam-piston ..... 325
Valve, steam-plug ..... 8
Valve, water-closet ..... 171, 172
Valves, throttle, mold for casting ..... 136
Valves to relieve steam cylinders of water ..... 75
Vapor burner ..... 153, 172
Va or of hydrocarbon oils, generating, etc ..... 223
Vapor stove ..... 152
Vapor, medicated and aromatic, diffused ..... 359
Vapors, noxious, disinfected, from rendering houses, etc ..... 429
Variegated thread, producing ..... 286
Varnish ..... 43, 88, 324
Varnishing cloth, machine for ..... 206
Vault cover ..... 239
Vault light ..... 171, 290
Vault, ventilated, for wine, potatoes, etc ..... 123
Vegetable cutter ..... 136, 272
Vehicle ..... 360
Velocipede ..... 379
Venetian shutters, fastening slats of ..... 188
Ventilators fastening ..... 12
Ventilator, vacuum ..... 429
Vessel, discharging bilge water from ..... 255, 324
Vessels, discharging grain from ..... 308
Vessels, indicating the speed of ..... 225
Vessels, raising sunken ..... 290
Victorine cape and cuff ..... 325
Vinegar, making ..... 139, 205, 222, 289, 324
Vise ..... 9, 41, 206, 413
Vise, carp nter's ..... 140
Vise for holding saws ..... 274
Vise or clamp, hand ..... 136
Vulcanizing flask for dentists ..... 137, 139
Vulcanizing indi-rubb r and leather ..... 91

W

Wagon ..... 122
Wagon-bow fastening ..... 291
Wagon brake ..... 155, 172, 174, 191, 207 (2), 208, 289, 326, 378
Wagon hubs, boring ..... 153, 325, 342
Wagon hub ..... 89
Wagon hubs, lathe for turning ..... 137
Wagon jack ..... 56, 88
Wagon, lumber ..... 174
Wagon shackle ..... 222
Wagon spok s, machine for turning ..... 136
Wagon, spring ..... 392
Wagon-spring braces ..... 429
Wagon top ..... 207
Wagon-wheel fellies, dressing ..... 394
Wagon wheels, driving spokes in ..... 360
Wagons, shelving for ..... 340
Wall paper, hanging ..... 288
War rocket ..... 343
Warp dressing frame ..... 273
Wash basins, clamp for ..... 359
Washboard, rubber attachment to ..... 326
Washboards, fluting ..... 74
Wash boiler ..... 107
Wash boilers, kettles, etc. manufacturing ..... 362
Wash bowl and water closet ..... 325
Washer for s nd and minerals ..... 307
Washers for bolts ..... 137
Washing and wringing machine ..... 43, 307
Washing compound ..... 122, 307
Washing machine ..... 8 (2), 26, 27, 40 (2), 41, 57 (2), 59, 74 (2), 90, 104, 105 (3), 121 (3), 122 (2), 124, 136, 152, 153, 173, 188, 189, 206, 224, 257, 273, 288 (2), 292, 307, 324, 325 (2), 326, 343, 344, 360, 379, 394, 428
Washing machine and hurd ..... 342
Washing machine, surface for ..... 393
Washing machines, heater for ..... 308
Washing rubber, clothes ..... 88
Wash stand ..... 40, 429
Wash stand and desk ..... 120
Watc ..... 11, 91, 235
Watch and locket case ..... 89
Watch-chain hook ..... 239
Watch-pocket, afety ..... 40
Watch regulator ..... 341
Watch, repeating ..... 140
Watch, stem winding ..... 171
Water box for tweers ..... 42
Water closet ..... 26, 28, 104
Water cooler ..... 106, 288
Water drawer ..... 72, 89, 308
Water elevator ..... 24, 40 (2), 57, 58, 89, 90, 153, 172, 191, 208, 223, 251, 290, 324, 413
Water g ge float ..... 206
Water gage for steam generators ..... 137
Water gate ..... 153
Water indicator for steam generators ..... 24
Water meter ..... 275, 290
Water proof co position ..... 206
Water-proof fabric ..... 90
Water, purifying and softening ..... 292
Water, raising it by steam ..... 240
Water wheel, 10, 24, 26, 89 (2), 91, 104, 107 (2) 136, 191 208, 238, 240, 290, 291, 327, 340, 378, 429, 430
Water wh el, sheet-metal ..... 42
Water wheels, reaction, regulator for ..... 395
Weather strip ..... 57, 106, 204, 343
Weaving wire rope, machinery for ..... 57
Weeding ho ..... 191
Weighing car ..... 27
Weight ..... 224
Welding or brazing ..... 106, 325
Well borer ..... 26, 274, 343
Well packing ..... 256
Well tube ..... 72, 188, 206
Well tubes, receptacle for waste water of ..... 222
Wells, construction of ..... 153
Wells, grouting form for ..... 359
Wells sinking tubular ..... 43, 90, 288, 289, 292, 395
Wheat drill ..... 91, 204, 308, 359, 360
Wheel for vehicles ..... 121, 341
Wheel hubs secured to axles ..... 342
Wheel vehicle ..... 59, 324
Wh els, c rriage ..... 91, 208
Wheels of locomotive, attaching tires to ..... 255
Wheels, metal, construction of ..... 41
Wheelwr ght machine ..... 361
Whiffletree ..... 139, 171, 191 (2), 204 (2), 288, 324
Whip rack ..... 256
Whip socket ..... 173, 326
Whippletree coupling ..... 341
Whirling jack for toys ..... 12
Whisky, p rifying and deodorizing ..... 106, 107 (2)
Whistle for steam engine ..... 290
White lead, manufacture of ..... 91, 309, 379 (2)
Wick inserter for lamps ..... 410
Willow dresser for bask ts ..... 292
Willow, machine for peeling ..... 288
Wind mill ..... 137, 362
Wind sail ..... 326
Wind wheel ..... 59, 89, 207, 325, 377
Winder, chalk-line ..... 326
Windlass, ship's ..... 41, 137
Window blind ..... 58 (2)
Window blind fastening ..... 255, 256, 413, 414
Window brush ..... 380
Window curtain ..... 274
Window-sash supporter ..... 9
Window screen ..... 306, 26
Window-shade fastening ..... 208
Window-shade slats, cutting ..... 27
Window shutter ..... 342
Window shutters, hinge for ..... 359
Windows and doors, hanging ..... 394
Winnowing machine ..... 273
Wire of helices, insulating ..... 238
Wire, removing it from bottles ..... 289
Wires, machine for pointing ..... 205, 375
Wood-bending machine ..... 105, 256, 290
Wood-boring machine ..... 56, 189
Wood, composition for filling ..... 306, 238
Wood, machine for cutting ..... 257
Wood, ornamenting ..... 8
Wood polisher ..... 360
Wood saw, hand ..... 273
Wood sawer ..... 291
Wood-scr ping machine ..... 275
Wood screws, c pping ..... 12, 359
Wood, season ng ..... 255
Wood-splitting machines, operating ..... 342
Wooden hoop bend r ..... 341
Woo len legs, tool for working ..... 190
Wool and woolen goods, cleaning ..... 137
Wool-burring machine ..... 41
Wool fleece folder ..... 74
Wool fleeces, tying and packing ..... 414
Wool, oiling it for carding engines ..... 327
Wool press ..... 288, 290
Wool, removing vegetable matter from ..... 58
Wool, scouring ..... 241
Wool, shearing twis ed strands of ..... 412
Wool washer and dryer ..... 377
Wool-washer cylind r ..... 241
Wool yolk, separ ting fatty matter from ..... 308
Woven fabric ..... 72, 188
Wrecking car ..... 153
Wrench ..... 27, 43, 90, 104, 123, 172, 273, 341, 359, 360 378
Wrench, adjusta le ..... 240
Wrench, double-headed ..... 325
Wrench for nuts or carriage axles ..... 122
Wrench, pipe ..... 173
Wringer and washing machine ..... 238, 414
Wringing-machine clamp ..... 274
Writing and drawing cards ..... 121
Writing and printing machine ..... 138
Writing ink, making ..... 359

Y

Yarn before weaving, treating ..... 410
Yarn dryer ..... 396
Yeast-cake dryer ..... 205
Yeast for baking, substitute ..... 412
Zinc and le ad, treating sulphurets ..... 361


## Reissues.


Ash-pan drawer for stoves ..... 60
Ash-sifting pan for stoves ..... 60
Bag frame ..... 174
Balances ..... 156
Blower ..... 258
Bomb lance for killing whales ..... 140 (2)*
Bonnets, bonnet frames, etc., machine for pressing ..... 13
Boot and shoe soles, machine for cutting ..... 92
Bottle stopper ..... 328
Bronzing or coloring iron ..... 208
Buildings, warming and ventilating ..... 28
Camera, solar ..... 60
Carpet lining ..... 431 (2)
Car spring ..... 75, 156
Carriage, preventing its rattling ..... 225
Centrifugal machine ..... 60
Churn bodies, construction of ..... 192
Cider mill ..... 140
Cla pulverizer ..... 431
Clothes wringer ..... 414
Cooking stove ..... 13, 91, 275 (3)
Cotton-bale hoop lock ..... 431
Denture, artificial ..... 414
D still tion ..... 380
Distilling rock oil, etc ..... 75 (2), 396
Egg pan and cake baker ..... 13
Envelopes, machine for gumming and printing ..... 241
Fire alarm ..... 414
Gaiter shoe and boot, water-proof ..... 28
Gas burner for cooking, etc ..... 292
Gas, carbureting ..... 225, 292 (2)
Gas-pipe joint ..... 177
Governor, hydraulic ..... 411
Grain binder ..... 140
Gun stocks, boring and drilling ..... 414
Hammer, power ..... 396
Harrow ..... 380
Harvester ..... 28 (3), 140 (2), 192, 208, 310, 396 (5)
Harvester, grass ..... 140 (2)
Harvesters, supporting reels for ..... 344
Hay-hoisting machine ..... 225
Hay press ..... 75
Hoisting apparatus ..... 108
Horse hay fork ..... 345 (2)
Horse rake ..... 192, 208
Iron and steel, plating, tempering, and hardening ..... 60
Iron manufactured in imitation of bronze ..... 208
Journal box, railway ..... 140
Kindling fire, composition for ..... 124
Kneading dough, machine for ..... 241
Knit ing machines, circular, take-up for ..... 380
Label card ..... 140 (2)
Lantern ..... 140
Latch, knob ..... 225
Lamp burner ..... 414
Lard, tallow, etc., rendering ..... 328
Liquid cooler ..... 28
Loom ..... 292 (2)
Looms, picker-st iff motion for ..... 258
Manual-power machine ..... 192
Melodeon ..... 124
Nail plate-feeding machine ..... 60
Nuts, machine for making ..... 108
Paper, manufacture of ..... 241
Paper pulp, bleaching ..... 310
Paper pulp, treating wood, etc., for ..... 310
Paring apples, machine for ..... 156
Pegging jack ..... 124
Pump ..... 174
Railroad car brake ..... 11a
Railroad frog ..... 414
Reaping machine ..... 75
Refrigerator ..... 174
Saddle, riding ..... 363
Safe ..... 344
Salinometer ..... 192
Sausage stuffer ..... 124
Saws, machine for grinding ..... 13
Sewing machine ..... 140a (2)
Sewing machine, cloth guide for ..... 108
Shield for breast straps, metallic ..... 147
Shirt-collar ..... 60 (2)
Shir -collar, paper ..... 60 (2)
Shoes, etc., punching and eyeleting ..... 140
Shoulder-brace and suspender ..... 60
Soda water sirups, measuring ..... 414
Spinning machine ..... 192
Steam boilers, preventing incrustation of ..... 258
Steam engines, cut-off gear for ..... 2)
Steam engine, valve gear ..... 14
Steam gage ..... 75
Steel, making it dire t from ore ..... 140 (2)
Stove, heating ..... 92
Straw-cutter ..... 28, 363
Tanning ..... 431
Threads, machine for dressing and finishing ..... 60
Trip-hammer ..... 344
Valves, cut-off, operating ..... 292
Valves, slide, in direct-action engines ..... 225
Vault cover ..... 140a
Wagon-shaft shackle ..... 225
Washing and bleaching fibrous and textile sub tances ..... 92
Washing compound ..... 241
Washing machine ..... 258
Whiffletree attachment ..... 60
Whip-socket fastening ..... 344
Wristband ..... 60


## Designs.


Base-ball bat ..... 44
Blacking-brush handle ..... 241
Boots and shoes, metallic armor for ..... 124
Bottle ..... 44, 415
Bracket ..... 92, 258, 431
Bracket and lamp ..... 92
Buggy ..... 431
Burial case ..... 241, 258
Burial casket ..... 75, 397
Canceling stamp ..... 241
Candy figure ..... 241
Carpet pattern ..... 140, 241
Cemetery monument ..... 397
Center piece ..... 241 (2)
Chandelier ..... 92
Cigar and tobacco safe ..... 258
Clock ..... 92
Clock case ..... 60, 75 (2), 124, 241, 328, 431
Coach lamp ..... 328, 280, 397
Coffin handle ..... 140 (2), 258
Coffin trimmings ..... 140
Collar and cuffs ..... 44
Comb, child's long ..... 241, 248, 276
Comb, child's long, ornamenting ..... 310
Dentists' grinding lathe ..... 258
Drapery trimming ..... 276
Envelope ..... 28
Group of figures ..... 44, 415
Hall lamp, pulley ..... 241
Handle, fork or spoon ..... 241, 397
Hat advertising carriage ..... 397
Label ..... 241
Lamp flue ..... 258
Military monument ..... 328
Oil can ..... 363
Oil-cloth pattern, floor ..... 241 (2), 310
Paper collar ..... 44 (2), 75, 328
Paper cuffs ..... 75
Paper hangings, etc ..... 292
Pendent light ..... 92
Picture for animal studies, ornamented ..... 415
Picture frame ..... 241, 431
Reel ..... 2 8
Sewing machine ..... 258
Sewing machine, frame of ..... 258
Shafting hanger ..... 431
S awl border ..... 276
Snap hook ..... 241
Spoon handle ..... 258
Statuette ..... 60
Stove, cook's ..... 44, 75, 258, 415
Stove ornament ..... 241
Stove panel ..... 44
Stove plates ..... 124, 156, 241 (3)
Table cover ..... 345
Tetter goods ..... 92
Tobacco pipe ..... 363, 397
T p , ornamen tition of ..... 44
Trade mark ..... 28, 60, 92 (3), 124, 241, 275 (2), 328, 397, 431
Tumbler, drinking ..... 241
Watch plate ..... 92
Wheel ..... 258
Work basket stand ..... 124


## Extensions.


Beehive ..... 396
Beveling of skelps, etc ..... 396
Dumping wagon ..... 396
Fue granular, from brush wood, etc ..... 140
Grain separator ..... 396
Grinding mill ..... 396
Gutta percha, manufacturing ..... 140
Lath machine ..... 396
Lock for doors ..... 396
Loom, hand ..... 397
Looms, counterbalancing harness in ..... 396
Looms, throwing shuttles in ..... 397
Pe s out of boot soles, cutting ..... 396
Plow, constructing ..... 396
Power loom ..... 14
Spinning mule ..... ting ..... 396
Whippletre ..... ..... 396


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